THE TEXTILE MANUFACTURER

No. 1039. Vol. 87 Two Shillings and Sixpence July, 1961

Notes of the Month

SECOND WORLD CONGRESS OF MAN-MADE FIBRES

In the first four days of May, 1962 London will be the world capital of Man-Made Fibres. Telling the story of these fibres to users in the textile industries, and to consumers in all countries, is the aim of the Second World Congress of Man-Made Fibres, which will be held in the Royal Albert Hall from May 1 to 4 next year. The start of the congress will be the signal for synchronised programmes in many countries, relating to man-made fibres in general, and to fashion in particular including high-level social fashions, with Paris and London setting the pace. These and allied events will be held in the principal cities of the textile manufacturing countries.

The theme of the congress is "The Impact of Man-Made Fibres." The objective is to spell out the facts about man-made fibres, in semi-technical language for industrial users. For consumers everywhere there will be the story of man-made fibres in plain language and by visual displays. By invitation only, over two thousand delegates from some fifty countries representing the textile industries, allied trades and inter-governmental organisations, will attend the Congress under the auspices of the Comité International de la Rayonne et des Fibres Synthétiques (International Rayon and Synthetic Fibres Committee), presided over by Colonel F. T. Davies. C.I.R.F.S. with its headquarters in Paris, groups 86 producers of man-made fibres in 21 countries. The scope of the congress programme covers the impact of man-made fibres in clothing, in the home, on the public services and on other industries. For technologists and other experts there will be working sessions and discussions relating to man-made fibres in terms of applied research and development, economics and distribution. The plenary sessions will be held in the Royal Albert Hall. The working sessions will take place in the Connaught Rooms. The scientific programme includes five high-level papers on high-polymer research. Member countries of C.I.R.F.S. are: Argentine, Australia, Austria, Belgium, Brazil, Canada, Finland, France, Federal Republic of Germany, Italy, Japan, Mexico, The Netherlands, Norway, Spain, Sweden, Switzerland, United Arab Republic, U.K., U.S., and Uruguay.

MAN-MADE FIBRES IN LANCASHIRE

In its quarterly survey of the Lancashire textile trade in man-made fibres (based on statistics up to the first quarter of 1961) the Statistical Committee of the British Man-made Fibres Federation reports that retail sales of clothing compared with the last quarter of 1960 rose by 2½%. The whole of this increase was taken up by a sharp rise in imports of garments so that consumption of woven apparel manufactured in the U.K. was no higher than in the previous quarter. Deliveries of apparel fabrics of all fibres to makers-up were down by about 3%. Stocks of fabrics and garments in the hands of makers-up and distributors continued to fall. In the staple fibre section, final consumption of cloth converted in the U.K. was down slightly compared with the previous quarter. There was an even greater reduction in final consumption of unconverted fabric, and of yarn going to trades other than weaving. Reduction of final consumption as it affected spinners and weavers was greater therefore than for converters. It is estimated that stocks in the hands of converters, makers-up and distributors were again reduced and that in this quarter weavers also reduced their stocks. Spinners' stocks increased. At the same time as these movements in final offtake and stocks were taking place there were significant reductions in output at the spinning, weaving and converting stages. Compared with October/December, 1960, spun yarn production was down by 15%, woven fabric production by 10%, and converters' deliveries by 4%. Deliveries of spun apparel fabrics have been falling for over a year but up to the end of 1960 the impact on weavers and spinners was cushioned by increases in their deliveries for other purposes. The share of spun fabrics in retail sales of all woven apparel is estimated to have fallen from 13% to 12% over the past year.

In the filament section, both production and final offtake of woven fabric were higher than in the previous quarter. Stocks again increased overall by nearly 2 mn. yds. This increase was largely by converters and followed a long period of stock reduction in this section. In conclusion the Statistical Committee states that unless retail sales increase sharply, apparel fabric deliveries are unlikely to show any immediate rise. The rising trend in imports of garments, and, up to the last quarter, of fabrics, represents a danger. Insofar as garments of spun fabric are generally in a cheaper category than filament they are more likely to be affected by low-priced imports and their prospects may therefore be less good. The considerable stock decreases by makers-up and distributors should cease in the near future, however, so that deliveries at the converter level may rise even if the share of spun in retail sales shows no improvement.

WOOL TEXTILE LEADERS HOLD YEARLY CONFERENCE

More than 250 delegates from 18 countries, representing wool textile industries which have been estimated to exceed more than £2,000 million in their yearly trade, met in Holland recently for the thirtieth annual conference of the International Wool Textile Organisation, where the industry's scientific, technical and trading problems were discussed. Summing up at the end of the conference, D. G. Price, the secretary-general, said it had been the liveliest conference for ten years and although there had been much conflict of opinion in the discussion many important decisions had been reached. He added these points:—

(1) "Marketing of wool in Australia has led to an inquiry by a committee set up by the Australian Government under the chairmanship of Sir Roslyn Philp, a High Court Judge in Queensland. Sir Roslyn and the two other members of this committee came to Scheveningen and heard the views of the conference. It was unanimously resolved at the I.W.T.O. that just as there is no substitute for wool, there is no substitute for the free auction system in its sale on the world market. Further, that there should be more promotion of wool as a fibre."

(2) "Relations between the Six and the Seven were discussed and once again the general view was that the two groups should be joined together. Moreover, there are no wool textile problems which would make such a union difficult."

(3) "Long term profitability of the wool textile industry was a prominent theme. Textiles and clothing must get and continue to get a proper share of the consumer's spending power and wool textiles must get their due share of the textile market."

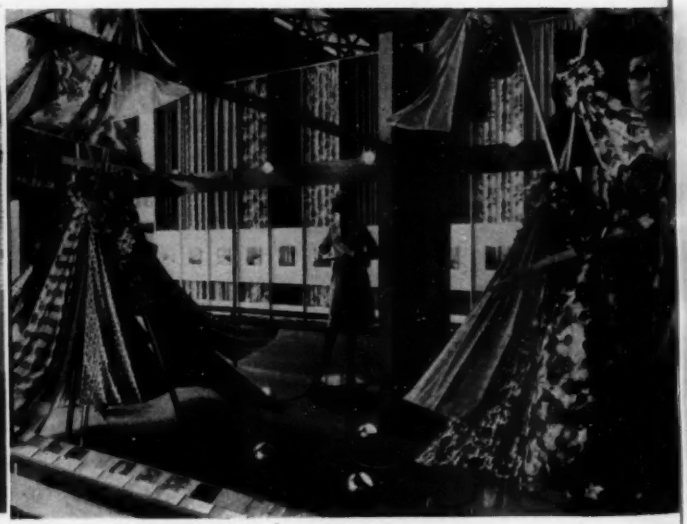
(4) "President Kennedy's intention to hold a conference of the governments of textile importing and exporting countries was mentioned by Dr. Snr. Lombardi in his I.W.T.O. presidential address. He expressed the hope that the difficulties of the U.S. in this field (largely with the cotton and man-made fibre industries) will not be resolved in such a way as to prevent the expansion of international trade."

During an address to the conference, Mr. R. L. Lund, regional director for Europe of the I.W.S., said that £3,800,000 would be spent in the coming year on wool promotion and research. Next year's I.W.T.O. conference will be held at the end of May in Oslo.

OPPORTUNITIES FOR TEXTILE INDUSTRY IN RUSSIA

THE British Trade Fair in Moscow closed on June 4 and members of the Cotton Board staff say that the Russian public showed tremendous enthusiasm for British cotton fabrics. Although cotton is widely used in Russia for clothing, it has not yet gained the range, versatility and prestige which it enjoys in this country and it was obvious that many of the Russian visitors to the Cotton Board Stand had no idea that cotton fabrics could look so attractive. Mr. D. Tomlinson (director, Colour Design and Style Centre) said that the public gave avid attention to every one of the cotton exhibits; the staff were literally hemmed in the whole time by eager crowds.

Russian acceptance of fashion and the public interest in it are ahead of the fabrics currently being offered in Russian stores and there is no question of the potential demand for fabrics such as those shown in the Cotton Board display. Representatives of British textile firms were received with the greatest cordiality and goodwill by Russian trade officials and Mr. G. D. Hughes, a member of the Cotton Board who visited the Fair, said that there would seem to be quite a number of opportunities for the British cotton industry to increase its sale of moderately priced cottons and higher quality cloths. The Russians, however, insist on dealing with principals and it would appear that firms prepared to tackle the market should decide whether the best follow-up to the exhibition would be to send a senior representative with a free hand to negotiate or, alternatively, for interested firms to form a consortium. It will be remembered that such a group of four leading Manchester textile firms sent a representative to Moscow within two days of the signing of the section of the Anglo-Soviet Trade Agreement relating to textiles.



In an area covering approximately 800 sq. ft., 100 women's and children's apparel fabrics from 43 cotton houses and 16 furnishing fabrics were displayed. All were selected from fabrics currently available in Britain to illustrate the range and versatility of British cotton. The furnishings, woven and printed, contemporary and traditional in character illustrated both curtainings and upholsteries. Photographs from popular magazines showed typical English interiors. The apparel fabrics were selected to illustrate the many different uses of cotton as a dress fabric.

The picture on the left was a general view of the stand showing, in the foreground, the Information Section. The photograph on the right is another view showing (right) a dress and coat by London Town in printed cotton satin by Ferguson. (Left) A group of "Town and Country Cottons" in shades of blue, also a suit by Raldon in tweed printed texture cottons by Hollins Mill. In the background is part of a collection of traditional cotton furnishings.

Production of Fancy Effects During Carding and Drawing

Details of fibre mixtures and blends, machine settings, also special attachments employed in carding and drawing to produce knop, slub, flake and similar attractive combinations

By N. PRIMENTAS

CARDING certainly offers more scope for the production of fancy effects in yarns than does blending. Many fancy yarns can also be produced more cheaply as in most cases, apart from some machine adjustments, no extra equipment need be employed. The ultimate price of the yarn may increase when fancy materials are incorporated though in some cases the cost of the fancy yarn is no more and can be even smaller than the cost of ordinary quality yarns.

Knop Yarns

This type of yarn may be produced by:—

(1) **Suitably adjusting some parts of the card so that a certain degree of fibre rolling occurs during carding and this causes the formation of small specks on the resultant web.**
(2) **Introducing previously prepared knops during the carding operation.**

In the first method one or more card rollers have wide settings or revolve in the opposite direction thus producing slubbings which are full of neps. Yarns spun from such slubbings are characterised by their irregular rough surface. Other variants of this type of yarn known as *knickerbocker* or *speck* yarn, can be obtained by introducing to a medium quality woollen stock a small percentage of fine merino noils or carbonised waste.

In a blend like the above-mentioned the prepared materials are fed to a card equipped preferably with coarse clothing. The roller settings, fairly open at the scribbler, are progressively closer at the intermediate and carder. Due to the coarseness of both setting and clothing, and to the heterogeneous nature of the blend, the fibres receive unequal treatment, i.e., the long coarser fibres are satisfactorily carded out but the fine ones roll and form into little specks. Altering the settings of workers enables a variety of speck sizes and shapes to be obtained.

In general, small knops are introduced to yarn intended for dress fabrics. If, however, larger specks are desired on yarns for coating fabrics then knops may be inserted into the ground material.

This can be effected at almost any part of the card, scribbler, intermediate, carder, feed lattice or at the swift.[10] Probably the most common practice in woollen mills is to insert the knops at the last swift of the carder and in front of the last stripper.

Fig. 4. shows a special attachment fitted to the card for dropping the knops. On lattice A—the same width of the card—a predetermined weight of knops is spread over a standard area X. The forward movement of the lattice brings the knop to the nip of a pair of feeding rollers B, B1 which in turn deliver them to a faster revolving roller C. The latter working in conjunction with the clearer roller D. drops the knops on the swift between stripper E and worker F.

The speed of the feed lattice and its respective complements of rollers can be adjusted to deliver the desired amount of knops, this is usually determined by trial.

From the viewpoint of effect uniformity the knops on any device must be evenly distributed over the standard area of the lattice and successive knop weights must be equal throughout the whole blend also uniform scattering of the knops without any bunches.

The most outstanding differences between knop yarns produced by blending and carding methods are the shape and prominence of the knops in the yarns. Knops introduced at the last stage of carding have little chance of being opened out. Therefore, their roundness is preserved and the resultant yarn is often more attractive although perhaps, not quite as stable. On the other hand knops applied to the ground in blending have to pass a tremendous number of carding points which in the process, elongates their shape and consequently they are not as prominent. These spindle-shaped knops also have many protruding fibres, an important factor helping as they do to anchor the knops better to the body of the yarn during twisting.

In any comparison of blending and carding methods it must be remembered that the former is much simpler in actual execution. Care should, however, be exercised in the application of the knops as it is almost impossible to rectify discrepancies at a later stage. The ground material should only be subjected to slight carding as the settings must be wide enough to preserve the shape of the knops.

In carding, an inaccurate knop proportion is easily remedied by altering the speed of the feed lattice or

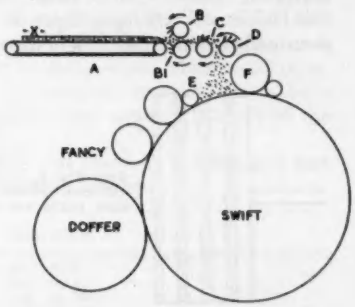


Fig. 4. Special attachment for dropping knops between worker and stripper on the card

correcting the weight of any coloured knops. The ground receives a full carding treatment and the knops show prominently in the yarn.

In spite of these advantages this method does not find favour amongst some carders for the following reasons:—

(1) During knop dropping a draught of air may carry the stream of knops in one direction thus disturbing the even spreading over the full width of the web.
(2) Where multi-coloured knops are concerned the thorough mixing is necessary.
(3) In many cases a certain amount of knops is left over due to a small speed inaccuracy of the knop lattice.
(4) The extra cost of a knop feeding attachment.

Knops can also be introduced to a batch of material in which cotton or worsted fibres are being carded. Knoppy slivers produced in this manner are processed similarly to any ordinary slivers, the only difference being that they must not pass through the combing operation.

At the drawing stage the knop slivers may be blended with the ordinary tops or with the cotton slivers. Experience has shown that when either the cotton or English system of drawing are used for such slivers the twist must be increased slightly and the speed of the spindler reduced. Finally, it must be remembered that some knop waste results during processing particularly on gill boxes due to the presence of faller pins.

Hitherto attention has been concentrated upon the manufacture of knop yarns. Apart from these many other effective "slub" and "flake" yarns can be successfully produced on a woollen card. Before going into details of the methods used in their production it might be advisable to draw a distinction between these two types.

Slub yarn can be defined as a yarn which has a more or less prominent bunch of fibres at regular or irregular intervals along its length. The bunches of fibres in a flake yarn, however, are neither as defined nor as regular in size as those found in the slub yarn.

Slub Yarns

These can be produced on ring doffers by using fillets of varying widths (Fig. 5). A broad part of the fillet collects more fibres from the swift which on condensing form a thick portion in the slubbing and ultimately slubs in the resultant yarn. The spacings of these wide fillet parts mainly determine the spacings of slub in the yarn but some influence is also exerted by the drafting forces during spinning.

For greater variations in slub spacing other doffers having suitably spaced wide parts in their rings are employed.

An alternative method comprises a doffer, the rings of which have a number of "hills" and "valleys."[11] These are easily made by inserting under the rings flat iron ribbons say, $\frac{1}{2}$ in. wide and $\frac{1}{32}$ or $\frac{1}{16}$ in. thick. A doffer clothed in this fashion collects more fibres on its high places, resulting eventually in thick portions in the yarn.

For a well defined slub it is important to ensure that the distance between two consecutive elevated parts is sufficient in order to allow the ring fillet to come into contact with the surface of the doffer; a minimum spacing on a 40 in. doffer is approximately $2\frac{1}{2}$ in.

Flake Yarns

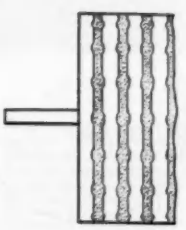
A flake yarn may be produced by plucking out wires across the width of the last worker of the carder (Fig. 6). Fibres from the swift are gathered on the worker in the form of strips which are then deposited on the swift at intervals. These fibre bunches are condensed with the rest of the web into slubbing and, after the yarn is spun, will form distinct flakes. A much easier and more flexible way of making a flake yarn is to apply an intermittent movement to one or more of the last workers of the carder. When the worker is stopped an accumulation of fibres occurs on its wires. These are then transferred to the swift at intervals governed by the design of the cut driving gear.

A coloured flake can be introduced to woollen yarns by feeding slubbings in an intermittent manner. This can be conveniently arranged by fixing a condenser spool over the last stripper of the carder (Fig. 7). A pair of feeding rollers *A* deliver controlled lengths of the slubbings and feed them to the swift. In practice, the colour of the slubbings for the flakes differs from the ground and when a two-colour flake is desired two spools with the appropriate colours must be creeled. Two drawbacks to the foregoing method of flake yarn construction are:—

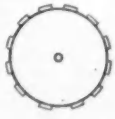
(1) Spools of the required coloured slubbings must be prepared.
(2) Replacing of a nearly empty spool with a full one means that the whole card has to be stopped.

Fancy Yarns in Drawing

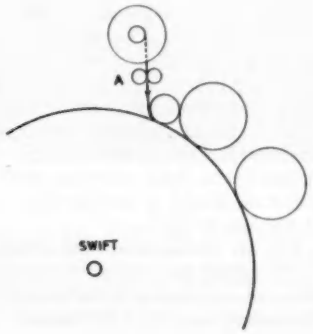
Whilst blending and carding are very suitable processes for producing knop or down yarns recourse has sometimes to be made to the drawing operation. This may be necessary where the blending and carding machines are not available or when it is desirable to comb the card slivers. The usual method consists of sandwiching the fancy materials between a number of slivers just prior to the latter entering the drafting zone of a gill box.[12] After drafting the "fancies" are found in the sliver in large clusters. In order to promote their distribution a number of these slivers are combined to undergo a second gilling operation. Practice has shown that two gillings suffice for the preliminary mixing of slivers with the fancies, provided the material will be processed on the Continental system of drawing. A third gill passage may be necessary for the English drawing system.



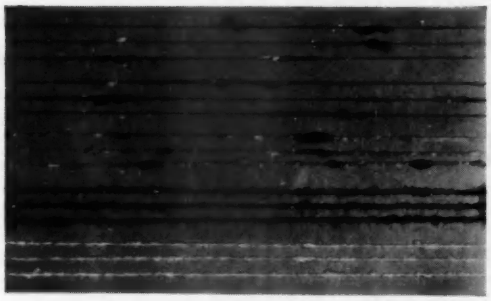
(left) Fig. 5. Using fillets of different widths to produce slub yarns on ring doffers

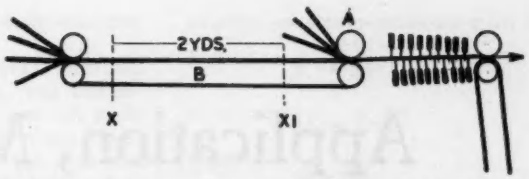


(left) Fig. 6. Last worker on the card has wires removed across the width to make flake yarns



(right) Fig. 7. Arrangement for producing a coloured flake yarn by feeding controlled lengths of slubbings to the swift





above) Fig. 9. Diagram of the arrangement for threading slivers and application of neps on the gill box

(left) Fig. 8. Display card showing five different types of knop yarns

To illustrate this technique, consider a case when 250 lb. of a 1/28s nep yarn containing 92% 60s white merino wool and 8% multi-coloured neps—3% red + 3% turquoise + 2% yellow—are required. The first essential is to determine the respective weights of the component materials; thus the weight of:—

$$\text{White wool top 92\%} = \frac{92 \times 250}{100} = 230 \text{ lb.}$$

$$\text{Red neps 3\%} = \frac{3 \times 250}{100} = 7{\cdot}5 \text{ ,,}$$

$$\text{Turquoise neps 3\%} = \frac{3 \times 250}{100} = 7{\cdot}5 \text{ ,,}$$

$$\text{Yellow neps 2\%} = \frac{2 \times 250}{100} = 5 \text{ ,,}$$

During drawing and spinning some waste of materials is unavoidable, so that the above weights must be corrected for this factor. A 92% yield is estimated for this lot so the final proportions are as follows:—

$$\text{White wool top} = \frac{100 \times 230}{92} = 250 \text{ lbs.}$$

$$\text{Red neps} = \frac{100 \times 7{\cdot}5}{92} = 8{\cdot}15 \text{ ,,}$$

$$\text{Turquoise neps} = \frac{100 \times 7{\cdot}5}{92} = 8{\cdot}15 \text{ ,,}$$

$$\text{Yellow neps} = \frac{100 \times 5}{92} = 5{\cdot}43 \text{ ,,}$$

The next step is to divide the 250 lb. of tops into two "sets." The first set will be blended with the neps in the preliminary stage of mixing whilst the other set will be used in the first drawing operation in conjunction with the prepared nepped slivers for the final mixing. From the practical point of view it is convenient to have at the first drawing operation both types, i.e., nepped and ordinary slivers of equal weight and length. Thus, the weights of the sets must be 114 and 136 lb. respectively (114 + 8·15 + 8·15 + 5·43 = 136). By testing, the weight of the top sliver was found to be 285 drams/40 yd. Seven ends can be fed into one head of the gill box.

Having decided the number of doublings the next stage is to work out the weight of the neps (prepared beforehand by manual mixing) which must be placed on a certain length of the fed slivers.

The entire length of each of the 7 slivers is —

$$\frac{40 \times 114 \times 16 \times 16}{285 \times 7} = 585 \text{ yd.}$$

and supposing the operative spreads the neps over a 2 yd. sliver length the standard nep weight corresponding to this —

$$\frac{2 \times 21{\cdot}73 \times 16 \times 16}{585} = 19 \text{ drams}$$

Table 3

Machine	Drams/40yd. fed	Doublings	Draft	Drams/ 40yd. delivered
Intersecting G. box	285	7	6·5	365·4
with spreader	(+380 drams of neps)			
Intersecting G. box ..	365·4	5	6·41	285
Melange inters. G. box ..	285	3 × 6	6·5	789·2
Intersecting G. box ..	789·2	2	6·5	242·8
Intersecting G. box ..	242·8	3	6·5	112
1st. drawing box	112	2	4	56
2nd. drawing box.. ..	56	2	4·2	26·6
3rd. drawing box ..	26·6	3	4·2	19
4th. drawing box	19	3	4·1	13·9
5th. drawing box	13·9	3	4·1	10·2
6th. drawing box	10·2	2	3·7	5·5
Spinning frame	5·5	1	8·5	1/28s worsted

Table 4

Machine	Drams fed /40 yd.	Doublings	Draft	Drams delivered /40 yd.
Intersecting G. box ..	282	4	6	188
1st porcupine box ..	188	2	4	94
2nd porcupine box ..	94	2	4·3	43·7
3rd porcupine box ..	43·7	2	4·3	20·2

The method of threading the slivers and the application of neps is shown schematically in Fig. 9. Between the feed rollers A of the gill box runs an endless canvas apron *B* on which four of the seven slivers rest closely together. The remaining three slivers are fed straight to the feeding rollers so that when viewed from the side they form a "V." Nineteen drams of neps are spread continuously every 2 yd., a distance shown between X and X1 on the apron. The draft of the machine is adjusted to 6·5 which delivers a sliver weighing 365·4 drams/40 yd. Five of these slivers are used in the second gilling, the objective being twofold. In the first place nep distribution in the slivers is improved considerably. Secondly, the draft is suitably adjusted to produce a sliver weighing 285 drams/40 yd.

Final blending takes place on the 3-head melange intersecting gill box. Three nep slivers and three ordinary slivers are fed to each head and, from this point the slivers undergo the same number of operations with similar doublings and drafts as used in drawing ordinary slivers. The machines, doublings and drafts required to convert the above materials into a 1/28s worsted counts yarn are given in the Table. 3.

It is appropriate at this stage to mention a special yarn made on the Continental system of drawing which, although it has very limited applications, it produces light hand knitted articles, possessing an excellent handle and good thermal properties. Strictly speaking this yarn is actually a twistless roving obtained from the porcupine box but it can be safely handled in spite of the absence of twist. Sufficient strength can be imparted to such slivers by a careful selection of the fibres and suitable settings of the last porcupine box.

The data set out in Table 4 is based on practice and may be taken as a guide for machine settings.

References

(10) J. Dantzer D. De. Prat: "Fabrication des Fils de Fantaisie," Librairie Polytechnique, Ch. Beranger, 1930.
(11) J. R. Dunn. Tex. Wor., 1941, 91, 4.
(12) H. Melton. Tex. Man., 1938, 64, 760.
(13) G. P. Peeler. Tex. Wor., 1957, 9, 133.

Application, Measurement and Characterisation of Stretch in Chemically Unfixed Spinning Threads

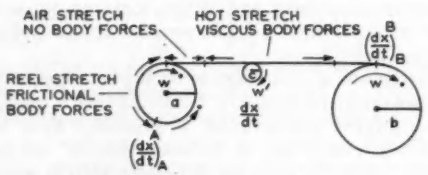
A number of methods are available for the measurement of thread velocity and, hence, the measurement of stretch

THE viscose process was a wet spinning process in which the spinning solution of cellulose xanthate was extruded through fine holes into a coagulating bath and so formed a semi-plastic thread. This thread was later stretched by passing it from one rotating surface to another, where one surface had a higher linear speed than the other. During this stretching process, the thread might pass through a high temperature bath or other processes, said Mr. E. V. Reeves, B.Sc., A.Inst.P. (Courtaulds Ltd.), at the Textile Institute Physics Group Conference held recently in Coventry.

While the thread was in the coagulating bath, stretch might be imposed due to the possibility of linear velocity changes in the thread associated with the rate of mass transfer between the spinning jet and the rotating surface pulling the thread from the bath; also, there might be effects due to the viscous drag forces operating on the thread by the coagulating bath. Although the forces operating in the coagulating bath were important, the subject here was concerned only with the behaviour of the thread in the "stretch zone."

Fig. 2. Photograph of successive exposures of marked thread

In certain methods of spinning viscose rayon yarns, use was made of self-advancing reels. These were rotating cylinders which were a combination of effectively two surfaces, the axes of which incline to each other, but had one common point. Such a system allowed the thread to be stored on the surface of the reel for treatment as well as providing a means for gripping the thread (through surface friction) during stretching treatments. It would be appreciated, therefore, that if two such reels were used to provide the "feed on" and "take off" reels in the stretch zone, some stretch was likely to take place on the surface of the first (or "feed on") reel. Further, since the thread was in a semi-plastic state when it was on the first reel and was virtually a fully-regenerated material by the time it was on the second (or take-off) reel, the total stretch applied would be distributed non-uniformly along the thread. It was one of the objects of



INITIAL LENGTH ELEMENT dx_A
FINAL LENGTH ELEMENT dx_B
INTERMEDIATE LENGTH ELEMENT dx

$$\text{TOTAL STRETCH} = \frac{(dx_B - dx_A)}{dx_A} = \frac{\frac{dx_B}{dt} - \frac{dx_A}{dt}}{\frac{dx_A}{dt}} \quad \text{FOR ANY TIME ELEMENT } dt$$

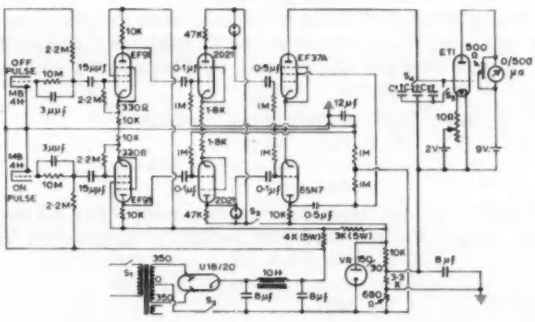
$$= \frac{b-a}{a} = \frac{b}{a} - 1$$

$$\text{INTERMEDIATE STRETCH} = \frac{\frac{dx}{dt} - \frac{dx_A}{dt}}{\frac{dx_A}{dt}} = \frac{w'c - wa}{wa}$$

$$= \frac{w'c}{wa} - 1$$

(left) **Fig. 1. Diagrammatic representation of stretching system with basic elements required to determine stretch**

(below) **Fig. 3. Circuit of electronic timer**



the study reported here, to determine that distribution. Such information was important, since it was not only necessary to stretch a viscose rayon thread by a fixed amount, in order to produce the required orientation in the micro-structure, but also to impose the stretch at the right place and at the optimum rate.

Fig. 1 demonstrates the principles behind any measurements made in the stretch zone. The equations given in Fig. 1 show the transformation from considerations of stretch in a static system to those in a dynamic system, so that ultimately, measurements of stretch are concerned with measurements of velocity. Also, in Fig. 1, the stretch zone is divided into three parts. The first part is associated with any stretch which may take place on the surface of the reel, where apart from the introduction of elastic and inertial forces always found in dynamic stretching systems, there are also "body forces" due to the friction between the semi-plastic thread and the surface of the reel. The second part of the stretch zone is indicated as including no body forces while the third part shows the presence of body forces found in the hot stretch bath where viscous drag forces are important. The velocity of the thread increases from $(dV/dt)_A$ to $(dV/dt)_B$ in travelling from point A on the first reel, where the velocity of the thread is equal to that of the reel surface, to point B on the second reel. At any point between, the velocity will be (dV/dt).

There are a number of methods available for the measurement of thread velocity and hence, the measurement of stretch.

The first and simplest method, continued Mr. Reeves, was demonstrated in Fig. 1 where use was made of a rotating frictionless wheel placed against the thread. If the rotational speed of this wheel could be found by stroboscopic observation and if the radius of the wheel was known, then the velocity of the thread at that point might be found. There were two disadvantages with this method:—

(1) **Some pressure was required between wheel and thread in order to get true contact and hence, the thread would be disturbed.**

(2) **It was not easy to use such a method when the thread was on the first reel or in the hot stretch bath.**

The second method available made use of cinephotographs. A mark was imposed on the thread before it reached the stretch zone; this had been done with an oil paint. This mark was then photographed kinematically under stroboscopic illumination of known frequency. If the velocity of the film and the frequency of the stroboscope were known, then the time interval between exposures might be found. Also, if the de-magnification on to the film was known, the real distance between the mark in successive exposures might be calculated. Hence, knowing the distance moved by the mark and the time taken, the velocity might be calculated. This method had been applied in practice and a typical set of exposures was shown in Fig. 2. These shots were made in the hot stretch bath using a Stroboflood illuminant and a C.R.O. camera.

EQUATION FOR STRETCH BEHAVIOUR IN ANY ZONE

IN GENERAL, $\frac{dT}{dx} = \rho V \frac{dV}{dx} + F$

ON SURFACE, $\frac{dT}{dx} = \rho V \frac{dV}{dx} + \frac{\mu T}{R}$

IN AIR, $\frac{dT}{dx} = \rho V \frac{dV}{dx}$

STRETCH MODULUS, $\alpha = C - De^{-mx}$ OR $\alpha = ax + b$

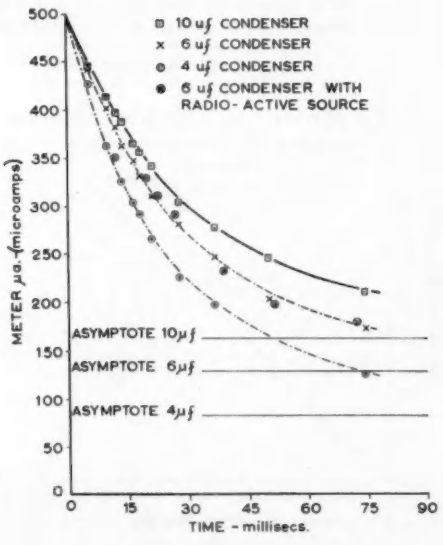
TO BE SOLVED,

$$\frac{dV}{dx} = \frac{(V-Vo)\left[(m+\frac{\mu}{R})De^{-mx} - \mu C/R\right]}{\rho Vo V - C + De^{-mx}}$$

T = STRESS, FORCE PER UNIT AREA
V = VELOCITY OF THREAD
F = BODY FORCE
ρ = DENSITY OF THREAD
x = SPACE CO-ORDINATE
μ = COEFFICIENT OF FRICTION
R = RADIUS OF CURVED SURFACE

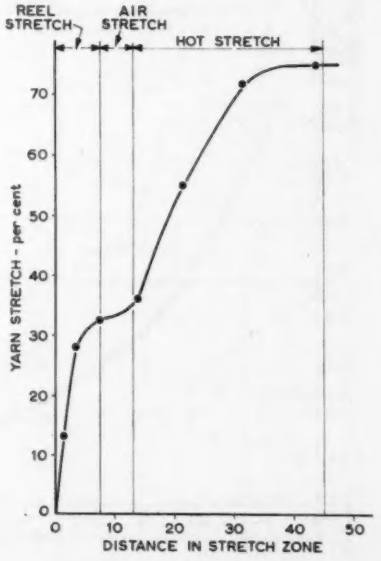
Fig. 5. Equations for stretch behaviour of spinning thread with ultimate differential equation for behaviour on first reel

The third method involved use of a marker but not a camera. Instead, the marker is detected either due to its radio-activity with Geiger counters or due to its optical properties by photocells. For the purposes of the measurement the radio-active marker had to be embedded in the yarn as a discrete point and have sufficient activity to cause the electric discharge of the Geiger counters. The simplest method of embedding would be to disperse the radio-active material in the spinning solution before extrusion, so that the particles forming the discrete points had to be small enough to pass through the holes of the spinning jet and not produce weak points in the filaments; also, the material had to withstand the chemical action of the alkaline spinning



(left) Fig. 4. Calibration curves for electronic timer

(right) Fig. 6. Yarn stretch in stretch zone with three parts for particular experimental conditions



solution. The most suitable material for this purpose was radio-active Gold 198, which emitted a β-particle of 0·96 mev and which could be given a specific activity of 6 Curies per gram after exposure in a pile at Harwell. Calculations showed that the required amount of material had an activity of 1·3 milli-Curies with an activity per particle of 20 microns diameter of 0·5 micro-Curies.

The method involved the use of two Geiger counters placed 2 cms. apart with apertures of less than 2 mms. Calculations showed that if ten measurements were made at any point in the stretch zone, of the time interval between pulses on the two Geiger counters, a mean value for that time interval would be an acceptably accurate value for determining the thread velocity at that point. The electronic circuit used for the experiment, Fig. 3, was a modified form of an earlier circuit due to Weisz and consisted in using the two pulses from the counters to activate separate thyratrons, which, in turn, caused an anode current to flow and then cease, in the pentode EF 37A. This current was used to charge one or other of the condensers in the grid circuit of the electrometer triode ET1. The charge developed on the condenser would depend upon the duration of the current flow in the pentode, so that the ultimate current flowing in the anode circuit of the electrometer would be a measure of the time interval between the two pulses.

This circuit had been used for calibration purposes with both photoelectric and electric discharge detectors. For these purposes, a disc, accurately balanced and mounted, was rotated through a variable speed Kopp unit. When using photoelectric detection, a small hole was bored near the periphery of the disc and two photocells P50A with their associated light sources were placed a suitable distance apart, so that the hole would permit the cells to be illuminated when it passed. By varying the speed of rotation from 450 to about 4,000 r.p.m. it was possible to vary the time interval between the pulses from 80 to 5 milliseconds. This was repeated with the Geiger counters by strapping a radio-active source, strontium 90, to the disc and rotating in the same way. Fig. 4 showed the calibration curves obtained using the three condensers shown in Fig. 3, between anode current in the electrometer triode and time interval between pulses.

Not only was it important to know the stretch distribution in a thread, it was also useful to be able to characterise the thread in terms of that stretch distribution. Therefore, some attempts had been made to fit equations to the stretch-stretch zone position curve at one or other of the three parts mentioned earlier. This had been done through the introduction of a "stretch modulus," which, for the purpose of this treatment was considered to be Hookeian in nature. This modulus was defined by a suitable function which possessed two or more constants, and the latter had been used to characterise the thread.

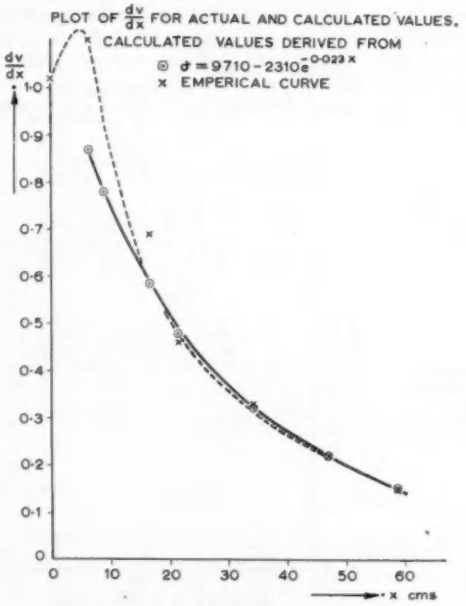
The appropriate equations, given in Fig. 5, might be derived by considering the forces in equilibrium, acting on unit volume of material. Thus, only if F, the "body force" and dV/dx were both zero, was the tension constant in the thread. This, in general, was not true, so that in that part of the stretch zone where frictional body forces were acting, as on the first reel, the appropriate equation was given in Fig. 5. If now, the relationship $T = \alpha E$ was introduced, where E was stretch, and where α was given in Fig. 5, the ultimate differential equation for that part of the stretch zone operating on the first reel was obtained, as shown in Fig. 5. Equations of this type were obtained for most systems studied and, apart from numerical methods, they were non-integrable. However, it was usually sufficient to leave them in the differential form, and from measurements of dV/dx and knowing the physical constants, it was possible to find the characterising constants of the stretch modulus. It had been found that a more typical relationship between T and E was

$$T = \frac{\gamma}{\beta}\left(e^{ke} - 1\right)$$

but no attempt had been made here to use such a form, although it would be fairly straightforward.

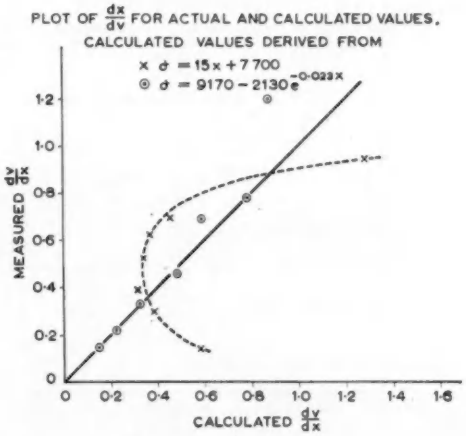
A particular set of measurements yielded the stretch distribution shown in Fig. 6. From measurements on similar curves to this, the orders of magnitude of the constants in the expressions for the stretch modulus were calculated, and then modified to obtain a fit of other curves. This had

(*continued on page 269*)



(left) Fig. 8. Plot of observed and calculated values for $\frac{dV}{dx}$ as functions of position in stretch zone

(right) Fig. 7. Plot of observed and calculated values for $\frac{dV}{dx}$



Relationship Between the Strength of Filament Yarn and a Corded Structure

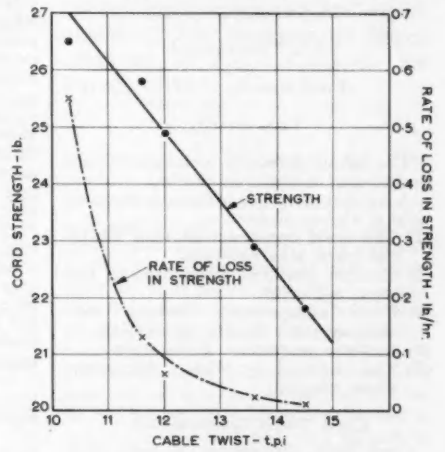
A discussion of the results of some investigations carried out in the Viscose Research Laboratories of Courtaulds Ltd.

HIGH tenacity continuous filament yarns were used extensively to reinforce tyres, conveyor belts, transmission belts, etc., but for a number of reasons it was often necessary to convert the yarn into a corded structure for such applications, said Mr. H. Cripps, B.Sc., in his contribution to the Textile Institute Physics Group Conference held recently in Coventry. The purpose of his paper was to discuss the relationship between the strength of the yarn and that of the corded structure into which it was twisted. The work had been carried out by the author and colleagues in Courtaulds' Viscose Research Laboratories, Coventry.

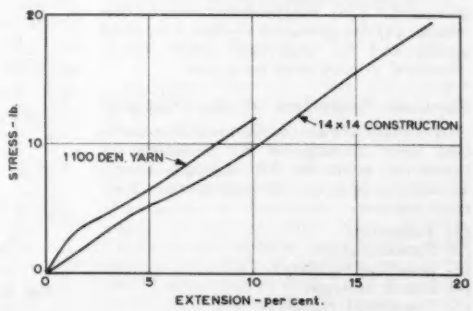
A corded structure, he continued, was normally produced by introducing Z twist into two or more lengths of continuous filament yarn and combining the twisted yarns (or plies) by twisting them together in the S direction. In practice, the majority of cords had only two components and had a balanced twist construction, i.e. the twist which was introduced and the ply yarns was equal and apposite in sense to that used to twist the plies together to form the corded structure.

The effect of twist construction on cord strength was illustrated by the conditioned cord load/elongation curves in Fig. 1, i.e. the strength of a cord diminished as the twist was increased. For this reason it was desirable to have as little twist as possible in the cord. However, it was found that repeated mechanical deformation of the cord in rubber (such as occurs in a running tyre) caused a gradual reduction in cord strength. This phenomena, called fatigue, was mainly associated with filament damage resulting from breakdown in the adhesion between cord and rubber. The rate at which the cord lost strength under these conditions was reduced by increasing the twist in the cord. In practice, therefore, a compromise was reached between cord tensile properties and cord fatigue properties. Fig. 2 showed the effect of cord construction on tensile and fatigue properties for a particular 2/1,650 den. cord. From such information, the optimum cord construction was obtained. In general, 1,650 den. yarns were corded to a 12(S) × 12(Z) construction and 1,100 den yarns were corded to a 14(S) × 14(Z) construction.

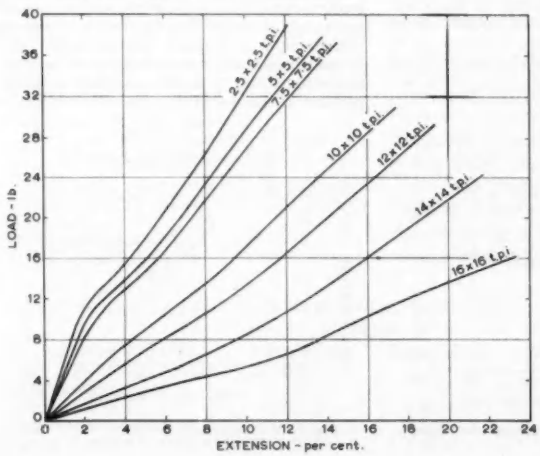
A typical load/elongation curve for a 1,100 den. high tenacity visco se rayon yarn and its associated 14(S) × 14(Z) cord, said Mr. Cripps, was shown in Fig. 3. It would be noticed that the two curves were of similar shape although the cord had neither twice the modulus nor twice the breaking strength of the yarn. These two factors could be explained in part, by the geometry of the corded structure. If one took the simplest possible view of a cord under load, it was possible to predict the maximum theoretical strength of this cord. If the two component yarns were subjected to a tension T, then the load on the cord W,



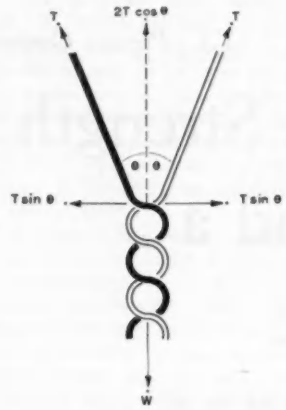
(right) Fig. 2. Effect of cable twist on cord strength and rate of loss in strength due to fatigue



(right below) Fig. 3. Typical load/elongation curves for rayon

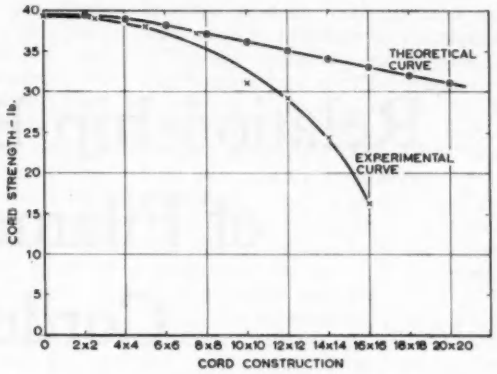


(left, below) Fig. 1. Effect of cord construction on load/elongation curves



(left) Fig. 4. Relationship between cord construction and cord strength as found experimentally

(right) Fig. 5. Effect of cord construction on cord strength



was balanced by the component of force $2T \cos \theta$ where θ was the angle between the component yarn and the cord axis. Hence the maximum theoretical strength of a cord was given by twice the yarn strength multiplied by the cosine of the angle θ. In practice, θ was obtained from the relationship $\tan \theta = 2\pi n a$ where n was the number of cable turns per unit length and a was one quarter of the cord diameter.

Fig. 4 shows the relationship between cord construction and cord strength as found experimentally and as predicted by the expression derived above for the 2/1,650 den. cords. It was clear that, in practice, maximum theoretical cord strength was not attained, said Mr. Cripps.

The strength realised by a cord in relation to that of the component yarns was called the cord yield and was defined in either of two ways:—

(i) $\dfrac{\text{Cord strength} \times 100\%}{2 \times \text{Yarn strength}}$ or

(ii) $\dfrac{\text{Cord tenacity} \times 100\%}{\text{Yarn tenacity}}$

The second definition took into account the increase in denier on cording.

A number of factors influenced the cord yield of a given material:—

(1) The cord construction into which the yarn was twisted.
(2) Certain physical properties of the yarn material.
(3) Cord components having dissimilar yarn tensile properties.
(4) Surface properties of the yarn.
(5) The method by which the yarns were corded.

Cord Twist Construction

Cord yield diminished as cord twist increased. This was probably due to two effects: (*a*) the geometrical effect described earlier and (*b*) transverse forces which increased as cord twist increased.

Physical Properties of the Material

A number of yarn (or filament) properties had been investigated for a variety of materials, went on Mr. Cripps, in an attempt to correlate these properties with cord yield:—

(1) Tenacity.
(2) Extensibility.
(3) Bending rigidity.
(4) Shear energy.
(5) Torsional rigidity.
(6) Crystallinity
(7) Loop strength } **Brittleness**
(8) Knot strength
(9) Loss of yarn strength due to cording.

It had often been found that a negative correlation existed between yarn tenacity and cord yield. Perhaps the main reason for this relationship was the higher transverse forces (i.e. the horizontal components shown in Fig. 4) associated with stronger yarns. These compressive forces would tend to inhibit filament movement during the breaking process so that the load was not distributed uniformly over all the filaments in the cord cross-section. This hypothesis was supported, to some extent, in that cords made from higher tenacity yarns tended to show greater deviations from the maximum theoretical strength curve depicted in Fig. 5.

A further possible reason for this correlation was apparent if the definition of cord yield was considered. Errors in measuring yarn tenacity would tend to produce such a correlation, i.e. an artificially low yarn tenacity would produce an artificially high cord yield and conversely. For viscose rayon yarn, cord yield appeared to be independent of yarn extensibility providing it was greater than about 10% or 11%. If the conditioned extensibility fell much below this level cord properties would be adversely affected. Low extensibility of course, might be a characteristic of brittleness.

Measurements of bending rigidity, shear energy and torsional rigidity had been made on a series of continuous filament yarns but it had not been possible to correlate these measurements with cord yield consistently.

In the case of a number of types of high-tenacity rayon yarns, the yarn with the highest cord yield had the lowest percentage crystallinity. Loop strength and knot strength were assumed to reflect, to some extent, the brittleness of the materials, although they were not fundamental properties. A plot of percentage knot strength against cord yield (Fig. 6) for six different materials including Fortisan, nylon, polyvinyl alcohol, and three types of high tenacity viscose rayon showed there was a strong correlation between these two perameters. This perhaps might be expected, since a knotted yarn would experience disturbing forces similar to those experienced by a yarn in a corded structure. It had been found that knot strengths afforded a quick method of predicting the cord yield of a given material. Loop strength measurements had also been found to correlate with cord yield although the correlation was not quite as good.

Yarn Strength Losses

Yarn strength losses due to cording had been measured for three types of viscose rayon yarn. The measurement consisted of cutting one of the ply yarns from the cord and comparing the strength of the remaining ply yarn with that of the yarn prior to cording. The strength losses suffered by the yarns were found to correlate with cord yield (Fig. 7). The strength losses were not associated with a reduction in the mean filament strength or with broken filaments and had therefore been termed "apparent yarn strength losses." Apparent strength losses had not been completely explained although they were thought to be due to stress relaxation in the ply filaments whilst in the cord structure resulting in permanent twist setting. This phenomenon would tend to disturb the hitherto uniform distribution of load throughout the filaments in the cross-section of a yarn extracted from a cord and placed under tension. This certainly appeared to be an

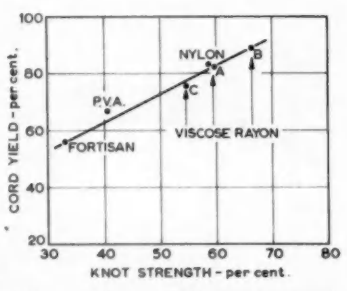


Fig. 6. Effect of brittleness on cord yield

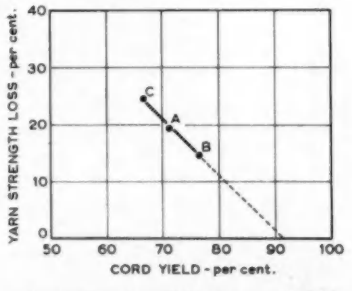


Fig. 7. Yarn strength losses v. cord yield for three types of rayon

Table 1

Viscose Rayon Type	O.D. Breaking Load			Cord Yield	
	Lubricated	De-Lubricated	Loss on De-Lubrication	Lubricated	De-Lubricated
A	26·7 lb.	22·8 lb.	3·9 lb.	63%	53%
B	32·6 lb.	24·9 lb.	7·7 lb.	69%	53%
C	36·5 lb.	28·0 lb.	8·5 lb.	69%	53%

important factor since the loss of strength on cording was found to increase with the length of time the ply yarn remained in the cord. Also, the strength of ply yarns whilst in the cord structure (i.e. tested by cutting, but not removing, one of the plies) was found to be much higher than that measured when the ply yarn was extracted.

It has been assumed so far that the two cord components had identical tensile properties. To test the effect of combining yarns whose tensile properties differed, a series of cords were made by combining all possible pairs of three types of high-tenacity rayon yarn. The results were plotted in Fig. 8 and showed that:—

(1) The strength of a cord made from two types of yarn was the same as that of the cord made wholely from the weaker yarn.

(2) The extensibility of a cord made from two types of yarn was the same as that of the cord made wholely from the yarn with the lower extensibility.

Surface Properties

By surface properties was meant the inter-filament frictional properties of the material and, for a given material, the only method of improving the surface properties is by the application of lubricant of finish. Lubrication was very important since it aided filament movement; in fact, a cord made from yarn devoid of lubricant, in which one might expect filament movement to be "inhibited" would always exhibit a poor cord yield.

The amount of lubricant applied to a yarn affected cord yield and increasing the amount up to about ½% or 1% would improve cord properties. After this point, however, there was no further advantage in increasing the concentration.

Contrary to expectation, experiments had shown that the presence of lubricant was not important during the cording process but only during the breaking process. Low inter-filament friction properties therefore, appeared to enable the filaments in a loaded cord to arrange themselves more efficiently throughout the cord cross-section. Table 1 showed the results obtained by delubricating a series of cords. It was clear from the results that the B- and C-type rayon yarns made more efficient use of the lubricant.

Method of Cording

Four main types of cording machines currently used in the conversion of yarn to cord were:—

(1) Ringframe.
(2) Uptwister.
(3) Combined corder (i.e. ply uptwisting followed by ring cabling).
(4) Direct cablers employing the false twist principle.

The type of cording machine used for conversion of the yarn could have a marked effect on the properties of the cord produced. Table 2 gave data obtained in one cording experiment. It could be seen that, although the four sets of cords were made from the same yarn and had identical twist constructions, cord deniers and cord breaking loads differed considerably. Cord denier differences were really a measure of cord compactness; the more compact a cord, the smaller was the angle between the ply yarns and the cord axis. A compact cord would contain less yarn and would tend to be stronger because of the geometrical effect. The cord made from the direct cabler was a striking example of this effect.

Differences in performance of the various types of cording machines were probably due to three factors:—

(1) The amount of mechanical disturbance suffered by the yarn during cording.

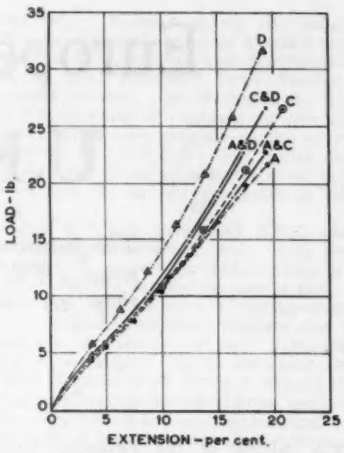


Fig. 8. Effect on cord strength of cord components of differing tensile properties

(2) Regularity of twist.

(3) The length of time the ply yarns remained in a highly twisted state prior to cabling.

The performance of any particular type of cording machine could be improved by adjusting the conditions of cording, i.e optimum choice of traveller weight, etc.

Table 2. Cord Properties

Cabling Process	RAYON "A" Breaking Load (lb.)	Extension %	Denier	Cord Yield %
Ringframe	28·3	12·8	3,882	66·9
Uptwister	27·2	12·4	3,865	64·3
Combined Corder ..	28·0	12·4	3,821	66·3
Direct Cabler	29·8	13·5	3,787	71·9

Stretch in Chemically Unfixed Spinning Threads

(*continued from page 266*)

been done for a hot stretch distribution for both forms of the stretch modulus given in Fig. 5 and the relationship between the observed values for dV/dx and those calculated for the same values of x was shown in Fig. 7. It would be seen that the fit for the form of the stretch modulus which assumed the exponential form was much more successful. The observed and calculated values for dV/dx had been plotted against x (position in the zone) in Fig. 8.

The stretch behaviour of spinning threads might be studied by the measurements of velocity of the thread at any point. Such measurements would show the distribution of stretch in various systems and would assist in determining whether the stretch was being imposed at the right point. It was possible to describe the stretch distribution by means of the "stretch modulus," the constants of which could act as characteristics for the thread.

ORAFIX T.R. Publication No. 2192 available from Ciba Clayton Ltd., Manchester 11, sets out the general properties and applications of this anionic pigment binder and flock adhesive. It is intended for use in the production of flock prints, matt and white pastel prints, opaque prints, metallic powder prints and matt white discharges on practically all types of fibres, including unions. Pointing out that it is suitable for roller and screen printing, the company say it is very economical and has no fire hazard. It is claimed to be fast to washing at the boil and rubbing and to possess maximum fastness to dry cleaning.

* * *

ELECTRIC MOTORS An informative 16-page booklet (No. 929), issued by Brook Motors Ltd., Empress Works, Huddersfield, for the electric motor user gives valuable help in obtaining the correct type of motor for specific purposes. Constructional variations, covering the needs of normal, dust laden or even explosive atmospheres are covered and a section on electrical modifications gives useful data on reversing, multi-speed and intermittent rating characteristics.

European Integration and the U.K. Textile Industry*

The future of the U.K. textile industry depends on individual firms. Will they be stimulated by the enlarged market? Will they set out to rationalise further their production and merchandising?

By A. M. ALFRED†

IN talking of the European textile industry it is important to recognise that E.F.T.A. is a certainty, calling for recognition and action now, whereas the possible union of U.K. with E.E.C. is merely a possibility. Therefore although investigations and some action with regard to "The Six" might be taken now, a major adaptation of the U.K. industry towards regarding "The Six" as part of an extended home market would be premature.

The future activity of the U.K. textile industry and ultimately its size will be determined by:—

(1) Competition within the new European "Home market";
(2) Growth of demand;
(3) External competition.

Item (1) in turn breaks down into (*a*) the magnitudes involved; (*b*) the existing foreign trade pattern and its implications for the future and (*c*) competitive cost factors.

The Magnitudes

The position of the U.K. in relation to other E.F.T.A. countries and to the community of "The Six" is shown by the following Table 1:—

Table 1. Cotton and Rayon

	Yarn mn. lbs.	Cloth mn. sq. yds.
U.K.	750	2,000
Other E.F.T.A. ..	370	1,000
E.F.T.A.	1,120	3,000
E.E.C.	2,300	5,000
Total	3,420	8,000

It will be seen that E.F.T.A. with a production of 1,000 mn.lbs. of yarn and 3,000 mn.sq. yds. of woven fabric is roughly half the size of the E.E.C., and that within E.F.T.C., the U.K. is two-thirds of the total, i.e. by being in E.F.T.A. the market available to the U.K. is increased by 50%, if we should integrate with "The Six" the market available to the U.K. would be quadrupled.

Both the E.F.T.A. and E.E.C. exported about one-third of their textile production. The nature of their trade is shown in Table 2.

Table 2

	E.F.T.A.	E.E.C.	E.F.T.A/ E.E.C.
% of production exported ..	33	35	35
Weight of exports mn. lbs.)	700	1,400	2,100
Distribution		% of exports	
To E.F.T.A. ..	12	22	18
E.E.C. ..	20	32	27
Other ..	68	45	58
		% of production	
E.F.T.A. ..	4	7	6 }
E.E.C. ..	7	11	9 } —15
Other ..	22	15	20

This shows:—

(1) About one-third of E.F.T.A. exports and a half of E.E.C. exports go to other E.F.T.A./E.E.C. countries. In both cases E.F.T.A. markets are two-thirds the size of E.E.C. markets:
(2) Thus for E.F.T.A. alone trade with Europe takes 11% of textile production. For E.E.C. alone trade with Europe takes 18% of their production, and for the whole of Europe the corresponding figure is 15%.
(3) From this it is clear that (*a*) there is significant trade between E.F.T.A. and E.E.C., with E.E.C. being more important to E.F.T.A. countries, than, vice versa; (*b*) intra-European trade is only a minor part of present European production; therefore its present structure is not important, and an indicator of the future orientation of the industry.

The basic element in textile costs is labour costs—composed of wage rates and productivity. Capital costs—composed of machinery and building costs, and interest rates, are also important but are unlikely to differ much from country to country. After taking account of social security payments, effective hourly earnings in textiles are set out in Table 3.

Table 3

Effective Hourly Earnings (U.K. = 100)

		Social Security %
E.F.T.A.		
Sweden	150	10
Norway	120	15
Denmark	110	15
U.K.	100	15
Switzerland	100	20
Austria	65	30
Portugal	40	80
E.E.C.		
Belgium	103	30
France	95	50
W. Germany	105	35
Italy	82	80
Netherlands	98	30

Differences in productivity are more difficult to assess. The incomplete statistical evidence available suggests that labour productivities—*on average*—are of the same order in all these countries, with the exception of Portugal, where her low wages go hand in hand with low productivities. The higher wages in Norway and Sweden are, however, at least in part offset by high machine productivity. Two shift working is normal in these countries (as it is also in Austria), output per spindle hour may be some 20% above U.K., and both countries have over 80% of its looms automatic, compared with the present 30% in U.K.

In Austria, output/spindle hour is high and she also has 50% automatic looms. Allied with her low wages she emerges as perhaps the most strongly based competitor. But her short-term impact is limited by the fact that she is already working two shifts and has only 6,000,000 spindles and 13,000 looms, around 5% of the E.F.T.A. total.

The U.K. position compared with E.E.C. countries is that:—

(1) Wages are not more than 20% different from those in the U.K. (Italy being the lowest).
(2) Machinery activity is considerably higher than in the U.K. (average 65 hours/week for weaving and 70 hours/week for spinning).

It should be noted that a 20% addition to hourly earnings adds only ¼d. or 1d./yd. to grey cloth produced at 8 looms/weaver, which is less than the 2d. c.i.f. charge from, for example, Italy to the U.K.

The above comment is, however, based on *averages*, of which we must be duly cautious. All concerned with industry know that the differences in output per man/hour and output per machine/hour between firms is marked. In the U.K. the range in labour productivity a few years ago between the top 10% of firms in, for example, cotton spinning, and the bottom 10%, is about 2 : 1. It is almost certain that in all the sectors of the textile industry in each of the countries concerned, the differences in costs from firm to firm within a country are greater than the differences on average between the countries. This means that while the average costs can give some indication of the direction in which present forces may tend to direct trade, the more important thing for individual firms is that there will be much give and take between countries, with the above average firms in all countries likely to progress.

---

* *Abstract of a paper presented at the recent meeting in Coventry of the Physics Group of the Textile Institute.*

† *Economics Dept., Courtaulds Ltd.*

The extent to which production can move from one country to another without fresh investment is, of course, determined by the surplus capacity available, taking into account the extent of shift working. After the recent reorganization scheme in the U.K. cotton industry (during which 12 million spindles and 100,000 looms were scrapped) the U.K. is still working only 55 hours/week on spinning and 60 hours/week on weaving. Thus full two or three shift working could produce several hundred million square yards of cloth extra. The other Six of E.F.T.A. countries are already working their looms an average 70 hours/week, and while there is scope for an increase which could be large in relation to their output, it would be small in relation to U.K. production. Nevertheless in most cases, machine capacity is unlikely to be a limitation to short-term encroachment into market of other countries of the E.F.T.A.

The present pattern of European trade, has, of course, been determined by non-qualitative factors such as styling and design, delivery dates and general production/sales co-ordination, as well as cost factors. But there has also been present schemes organised by industry and in some cases by Governments to give special aid to exports of textiles.

As tariffs are reduced, dual pricing becomes less practicable, and eventually, except to the extent allowed by transport charges, impossible. The E.F.T.A. Treaty and the Rome Treaty both call upon all Governments to discontinue such practices, and it would be reasonable to expect industrial schemes to be withdrawn or scaled down as tariff reductions continued —or else the effect may be a general lowering of "home market" prices.

At present only 4% of E.F.T.A. textile production is traded within the Area. This must grow if the E.F.T.A. is to be meaningful. This picture of increasing trade between the countries of E.F.T.A. (or possibly to a larger united Europe) must be set against the total demand that is likely to be met by European production.

On the side of final consumption there is no reason to be pessimistic about the share of the consumers' pound which textiles might get. Recent experience in the U.K. and Europe has shown that, aided by falls in the prices of raw materials, changes in methods of distribution, new marketing techniques and the introduction of new fibres, the textile and clothing industries are more than holding their own against other goods.

On the question of imports from other countries, it is not so easy to be optimistic. Imports from Far Eastern countries into Europe are at the moment subject to artificial restrictions. In the case of imports from Japan both the U.K. and other European countries restrict the quantity to very small quotas; in the case of imports into the U.K. from Commonwealth countries, cotton cloth is subject to "voluntary" quotas which are, however, of considerable size.

The E.E.C. is considering its attitude towards a common quota against Japan, and in 1955 the U.K. expressed its ultimate intention of giving M.F.N. treatment to Japan. In due course liberalisation by the West towards imports of manufactured goods from under-developed countries must come. I suspect, however, that provided it applies to all commodities at the same time, and is applied simultaneously by the major importing countries of the West (including the U.S.) over a period of years, we need not treat the change as one of catastrophe. For example, even if Japan went on to three shift working and sent the whole of the extra output, nearly 3,000 mn. yds. to Europe and North America, her exports to these countries would account for only 13% of their present production. These figures are certainly not catastrophic when compared with the present scale of imports into the U.K. Last year imported cotton cloth accounted for 38% of total U.K. home consumption.

Summary and Conclusions

My principal points are these:—

(1) The creation of E.F.T.A., which is a certainty, requires us to regard the six (or now seven) other countries in addition to the U.K., as our new home market. The potentiality for the industry is increased by over 50%. Without doubt the other E.F.T.A. countries are going to attack the attractive U.K. market and competition will be felt, especially from Sweden, Portugal, Austria, and Switzerland. To put it at its worst, to maintain our own we must adopt a new attitude to the other countries of E.F.T.A. and must be prepared to service them in the same way as we now service our customers in the U.K.:

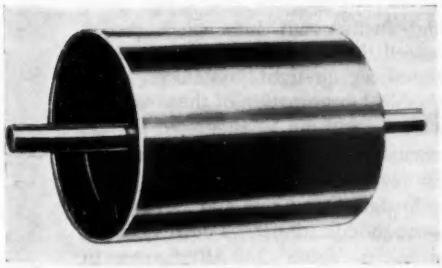
(2) If E.F.T.A. joins with E.E.C. our horizons are widened to four times the present U.K. market, the opportunities are greater, but the threats are greater too:

(3) The little we know of average wage rates, productivities, etc., indicate that a landslide in favour of any particular country is unlikely. But in any event, the future of an industry does not depend on "averages" but on individual firms, and it is the energy, flexibility and imagination, on the part of management, allied with the willingness of labour to accept changes, which will determine the relative success of our efficient companies, compared with the efficient companies in other countries in Europe. Evidence of the willingness and ability of the U.K. to undertake rapid changes is given in the remarkable success of the Cotton Industry Reorganisation Act, which has resulted in the average hours worked per unit of machinery increasing by 20% in the case of spinning and 30% in the case of weaving in a period of nine months;

(4) The U.K. clothing industry is well developed compared with that in most other European countries. This should give us an added tool in taking U.K. products into foreign markets.

It is worthwhile repeating that the future of the U.K. textile industry depends on individual firms. Will they be stimulated by the enlarged market; will they set out to rationalise further their production and merchandising? The efficient units that do this will, I think, gain much from freer trade in Europe at the expense of the backward businesses in all countries. It is up to us to ensure that the U.K. has a more than fair share of these progressive growth units.

New Magnetic Separator Incorporates Ceramic Magnet



Permanent magnetic pulley with "Andox 5" magnets for extracting tramp iron from processed materials

RAPID Magnetic Ltd., Lombard Street, Birmingham announce their new range of "Andox 5" permanent magnet pulleys for extracting tramp-iron from processed materials. The unit illustrated includes magnets made of the anistropic barium ferrite ceramic material whose exceptional coercivity permits a radical pole construction as distinct from the axial disposition adopted with alcomax magnets.

The company point out that the superior field intensities so produced are equivalent to those of electromagnetic designs, with flux distribution patterned to conform to the burden contour on the belt conveyor. Highest intensity occurs at the centre of the conveyor where burden depth is greatest. Possessing unusual pulling and holding power and using stainless steel covers for long mechanical life, the pulleys are available in a range of sizes from 12 to 24 in. dia. for any belt width.

Tweed Orders from Japan

Two consignments of Scottish wool tweed—the biggest ever ordered from Japan—are now on their way to Japan by sea. One, valued at £15,000, consists of women's winter-weight coatings made by W. F. Stewart Ltd., Galashiels. The other, consisting of coatings, suitings and sports wear is worth £12,000. This was despatched by Henry Ballantyne and Sons Ltd., Walkerburn. Commenting on his firm's order, John Ballantyne, director, and former president of the National Association of Scottish Woollen Manufacturers, said that Japan was the Scottish woollen industry's sixth largest individual market in 1960.

Examination of the Bast Fibres from the Male and Female Cannabis Sativa, Linn

Detailed analysis shows that the fibre from the male plant is a little richer in pentosans, gums and resins, whereas the fibre from the female plant contains a little more cellulose

By S. C. KHANDURI and B. BISWAS*

IT was reported by Morris[1] that the fibre extracted from the bast of male "true" hemp (*Cannabis Sativa, Linn., N. O. Moraceæ*) is stronger and better than the fibre of the female plant of the same species. However, in European countries both sexes are harvested at the same time for the production of fibre and therefore, the commercial fibre is always a mixture prepared from the male and the female plants harvested together. If seeds are desired, the male plants are harvested when the colour of the stem changes to light brown, and the female plants are allowed to grow for a further period of about three weeks.

According to Goulding[2], the fibre from the male plant is superior to that from the female plants which have been allowed to produce seeds. It is a general custom in India, to remove the male plants about 20 to 40 days earlier than the female plants if seeds are in view, otherwise the fibres of the male plants are ruined. In much the same way, if the seeds are allowed to ripe, the fibres of the female plants will be ruined. Whatever be the reason, fibres from the male and female plants are generally not separately prepared.

The examination of the bast fibre of *Cannabis Sativa* (presumably extracted from the stems of both sexes) was reported by different workers[3,4,5]. The wild variety of hemp, or the *Khur Bhang*, fibre was examined earlier by one of the present authors[6]. From a survey of the literature it appears that the fibres from the male and female plants have not been separately examined. In view of the fact that the fibre of the male plants is considered tougher and better than that of female[1,2], it was considered necessary to examine the fibres from different sexes of the plant, to find out differences, if any, in their chemical composition, to account for the difference, in the physical behaviour, attribed to these fibres.

* *Hartcourt Butler Technological Institute, Kanpur, India.*

Experimental

The male and the female plants, grown under identical conditions, were harvested separately, at the same time when the plants were in full bloom, as at this period the best quality of the fibre is obtained[7]. The harvested stem of male and female plants, defoliated separately, dried in the shade, and separately bundled, were steeped in water in two different wooden vats under indentical conditions and retting was performed in slow flowing water. The retting completed, the bundles were dried, side by side, and separately worked for extraction of fibres from the male and female stems. The physical characteristics of the stems of male and female plants and the yeild of fibre are given in Table 1.

The fibres from the male and the female plants were separately dissected into top, middle and bottom portions, and further cut into small pieces, passed through a 22-mesh screen and stored in air-tight containers. The chemical examination of these samples were carried out as suggested for the examination of the Indian fibres and fibrous substances[8]. The cellulose was estimated after Cross and Bevan with some modifications[9]. The results are given in Table 2. All figures in Table 2 and the following tables are expressed on oven-dry basis.

Table 1. Stem Characteristics and Fibre Yield

Particulars	Male	Female
Number of defoliated sticks in bundles	50	50
Weight of bundle (air dry) gm.	6037·5	4989·3
Weight fibre gm.	693·6	553·6
Yield of fibre of defoliated air dry stem %	11·49	11·09
Average length of fibre strands cm.	145	156
Average length of sticks, cm.	153	166

Table 2.

Analytical Figures of Fibres from Male and Female Plants

Plant	Portion of fibre used	Moisture %	Ash %	Hydrolysis (loss) %		Acid purification (loss) %	Water Soluble %	Fat and wax %	Cellulose %
				alpha	beta				
Male	Entire	6·61	2·72	10·01	20·07	3·01	1·05	1·40	76·71
	Top	6·04	2·02	9·47	20·45	2·93	1·21	1·50	76·30
	Middle	6·10	2·01	10·94	21·66	4·32	1·18	1·21	76·74
	Bottom	5·99	2·07	8·42	21·60	3·93	1·18	1·39	75·78
Female	Entire	4·38	2·13	10·91	20·52	4·75	1·02	1·60	79·27
	Top	5·37	2·17	11·96	21·40	3·82	0·98	1·57	78·30
	Middle	4·41	2·07	11·58	21·65	3·44	1·13	1·72	77·62
	Bottom	4·94	2·34	11·80	22·02	3·08	1·24	1·79	77·45

The figures in Table 2 show that there is not much difference in the analytical figures for the fibre of the male and female plants except a little in the case of cellulose. The cellulose content in the fibre from the male plants is somewhat lower than the cellulose content of the fibre from the female plant in corresponding portions. From the textile point of view, cellulose is the most important chemical constituent of long vegetable fibres. The celluloses isolated from different portions of the fibre were subjected to further examination. All textile workers recognise that a certain fraction of cellulose, insoluble in cold (below 20°C.) and concentrated (17·5%) caustic soda solution (termed alpha cellulose) is more important for various industries. The alkali soluble portions, termed the beta- and gamma-celluloses, were estimated by following the Tappi method, and the results are set out in Table 3. The figures in Table 3 indicate that the alpha cellulose content of the fibre from the female plant is somewhat more than that contained in the fibre from the male plant. The differences in the case of beta and gamma celluloses of the fibres are not much.

As these differences in the case of cellulose fractions were not pronounced it was considered necessary to estimate the non-cellulose constituents of these fibres. Nitrogen was estimated by the kjeldhl's method, from which the amount of protein was calculated (protein = N × 6·25). Gums and resins were determined by extraction with a mixture of alcohol and benzene (1:2). Lignin was estimated by the method of Ost and Wilkening[11] as modified by Ritter *et al*[12]. Furfural and pentosans were found out by following the method of A.O.A.C.[13]. The results appear in Table 4.

A comparison of the figures in Table 4 show that the fibres from the female plant contain somewhat less pentosans, gums and resins, and lignin. These differences, however, are not such as to merit warrant discussion in this article. It was, therefore, considered worthwhile to examine the furfural content due to polyuronides, alpha cellulose and xylan. According to Norris and Resch[14] 23·5% of the furfural is due to polyuronides. The furfural due to alpha cellulose is 1·23%[15]. Therefore, the balance of total furfural should be due to the pentosans. From the Kröber table the

Table 3. Examination of Cellulose

Plant	Portion fibre used	% Alpha cellulose on weight of		% Beta cellulose on weight of		% Gamma cellulose on weight of	
		Cellulose	Fibre	Cellulose	Fibre	Cellulose	Fibre
Male	Entire ..	84·32	64·69	10·61	8·14	5·07	3·98
	Top ..	83·86	63·83	10·21	7·79	5·93	4·58
	Middle ..	84·81	65·04	9·98	7·66	5·21	4·00
	Bottom ..	84·21	63·83	9·88	7·49	5·91	4·48
Female	Entire ..	86·30	68·41	9·25	7·33	4·45	3·53
	Top ..	86·21	67·51	8·12	6·36	5·67	4·44
	Middle ..	85·88	66·67	7·98	6·20	6·14	4·77
	Bottom ..	86·11	66·70	8·28	6·41	5·61	4·35

Table 4. Important Non-Cellulose Constituents of the Fibres

Plant	Portion of fibre used	Furfural %	Pentosans %	Gums and resins %	Lignin %	Nitrogen %	Protein %
Male	Entire ..	4·24	7·08	3·14	5·97	1·05	6·56
	Top ..	4·40	7·52	3·20	5·57	1·02	6·38
	Middle ..	4·13	7·06	3·11	5·99	1·01	6·31
	Bottom ..	3·93	6·71	3·06	6·01	1·02	6·38
Female	Entire ..	3·68	6·31	2·14	3·27	1·01	6·32
	Top ..	3·77	6·47	2·52	3·19	0·99	6·19
	Middle ..	3·68	6·31	2·48	3·18	1·02	6·38
	Bottom ..	3·40	9·95	2·49	3·57	1·04	6·56

amount of pentosans present as xylan can be calculated from the formula—

$$\frac{\text{Furfural} \times 100}{64{\cdot}3} = \text{Xylan}$$

To sum up:—

(*a*) **Furfural due to polyuronides** = $\frac{\text{Furfural} \times 23{\cdot}5}{100} = X$

(*b* **Furfural due to alpha cellulose** = $\frac{\text{Furfrual} \times 1{\cdot}23}{100} = Y$

(*c*) **Furfural due to pentosans** = **Total furfural** $-(X + Y)$

(*d*) **Amount of pentosan present as xylan** = $\frac{\text{Furfural} \times 100}{64{\cdot}3}$

Calculating on the above basis the figures obtained are given in Table 5. A survey of Table 5 shows that the figures for fibre from the female plant are less than the corresponding figures for fibre of the male plant. The furfural content (and hence the associated calculated figures) are most in the top portion and least in the bottom portion of the fibre from both sexes of the plants. A comparison of the important chemical constituents of these fibres, the fibre of the wild hemp[6] and other important textile fibres[16] is made in Table 6.

The figures show that fibres containing low xylan contain low lignin. Based on the xylan content Norman[17] has classified long vegetable fibres into two groups. The high grade of fibres like ramie, flax and (true) hemp containing low xylan (and also low lignin), and the high xylan group which are also more lignified. The high grade fibres have relatively longer cellulose chain and are more or less free from cellulosan[18] (that is, the resistant xylan in cellulose structure) and have comparatively higher tensile strength than jute and other lignified fibres which are richer in cellulosan. The fibre of the female plant closely resembles the wild hemp fibre. The fibre of the male plant contains somewhat lower alpha cellulose and more lignin.

In view of the importance of hemicellulose in the structural units in the bast fibres, it was considered necessary to estimate the hemicellulose

Table 5. Examination Furfural and Pentosans

Plant	Portion of fibre used	Total furfural % (A)	% Furfural due to			Pentosans as xylan %
			Polyuronide (X)	Alpha cellulose (Y)	Pentosans A—(X+Y)	
Male	Entire ..	4·24	1·096	0·052	3·092	6·595
	Top ..	4·40	1·034	0·054	3·312	6·842
	Middle ..	4·13	0·971	0·051	3·108	6·422
	Bottom ..	3·93	0·924	0·048	2·958	6·111
Female	Entire ..	3·68	0·865	0·045	2·770	5·722
	Top ..	3·77	0·866	0·046	2·838	5·862
	Middle ..	3·68	0·865	0·045	2·770	5·722
	Bottom ..	3·40	0·779	0·042	2·559	5·287

Table 6. Comparison of True Hemp and Other Fibres

Constituents, %	True hemp fibre from		Wild hemp[6]	Italian hemp[16]	Irish flax[16]	Ramie[16]	Tosa[16] Jute (ordinary)
	Male plant	Female plant					
Alpha cellulose ..	84·32	86·30	87·02	89·23	91·20	85·97	75·84
Lignin	5·97	3·27	3·87	5·32	3·27	1·01	11·29
Furfural	4·24	3·68	3·42	1·11	2·32	2·39	9·76
Xylan in cellulose	6·59	5·72	—	1·73	3·01	1·30	11·85

Table 7. Holo- and Hemicelluloses in True Hemp and Other Fibres

Constituents, %	True hemp fibre from		True hemp	Flax	Jute
	Male plant	Female plant			
Holocellulose	88·04	86·82	82·72*	85·86	88·8
Hemicellulose (alcohol insoluble).	5·15	5·48	5·7	4·4	14·8

* According to Mazumdarss holocellulose in true hemp fibre is 88·0%.

(alcohol insoluble) in the fibres, but as in previous cases, not much difference in the composition of the top, middle and bottom portions was observed, only the entire fibres (of the male and female plants) were used. For the estimation of hemicellulose, the holocellulose was first prepared by the sodium chlorite method[19].

The (alcohol insoluble) hemicellulose was estimated by following the method of Sarker *et al*[20]. The holocellulose in true hemp (*Cannabis Sativa*), jute (C. olitorius), flax and other fibres has been estimated by Chatterjee *et al*[4], and the hemicelluloses (alcohol insoluble) of true hemp and other fibres are reported by Chatterjee[21]. The results of the estimation and the relevant figures (for comparison) are given in Table 7. The figures in the table show that the amount of holocellulose and the hemicellulose are nearly the same in fibres from the male and female plants.

The analytical figures in the foregoing tables show that the fibres from the male and the female plants are more or less similar in chemical constituents. The fibre from the male plant is a little richer in pentosans gums and resins and lignin, whereas the fibre from the female plant contains a little more cellulose. However, based on the chemical examination, no indication is forthcoming as to why, as mentioned in the literature, the fibre extracted from the male plant should be better than the fibre extracted from the female plant. On the other hand, the result of the examination suggests, that under identical conditions of cultivation, growth, harvesting, retting and preparation, fibres of both sexes are more or less similar in chemical composition, and should, therefore, exhibit similar physical and textile properties.

References

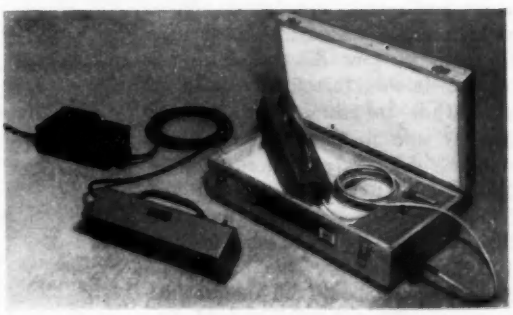
(1) Morris, J., "J. Soc. Arts (Cantor Lect.)", 901, 1895.
(2) Goulding, E., "Cotton and Other Vegetable Fibres", 1957, "Imp. Inst. Handbook", John Murry, London, p. 115-16.
(3) Muller, A., "Anleitung Zur Ausfuhrung Textile Chemische Untersuchungen", Vienna, 1904.
(4) Chatterjee, H., Pal, K. B. and Sarkar, P. B., Text. Res. J., 24, 1, 43, 1954.
(5) Mazumdar, A. K., "J. Sci. and Ind. Res.", 14B, 10, 542, 1956.
(6) Lohani, B. K., and Biswas, B., "Text. Mfr.", 79, 942, 329, 1953.
(7) Ludwing, W., "Long Vegetable Fibres", Columbia University Press, New York, p. 276.
(8) Anon., "Bull. Imp. Inst.", 27, 444, 1929.
(9) Biswas, B., and Athawale, D. Y., "J. and Proc. Inst. Chem. (India)", 18, 98, 1946.
(10) "Tappi", 1945.
(11) Ost, H., and Wilkening, L., "Chem. Ztz.", 34, 46, 1910.
(12) Ritter, G. J., Seborg, R. M., and Mitchell, R. L., "Ind. Eng. Chem. Anl. Ed.", 4, 202, 1932.
(13) "Assoc. Official Agr. Chem." Official and Tentative Methods of Analysis, 1935.
(14) Norris, F. W., and Resch, C. E., "Biochem. J.", 29, 1590, 1935.
(15) Sarkar, P. B., Mazumdar, A. K., and Pal, K. B., "J. Text. Inst.", 34, T-44, 1948.
(16) "Review of Textile Progress", 1949, "Text. Inst. and Soc. Dyers and Col. Publ.", 1, 65.
(17) Norman, A. G., "Biochem. J.", 30, 831, 1936.
(18) Norman, A. G., "High Polymers", Vol. V, Part I, Inter sci. publ. N.Y., Second ed., Ott. E., p. 468.
(19) Chattopadhyaya, H., and Sarkar, P. B., "Proc. Nat. Inst. Sci. India", 12, 23, 1946.
(20) Sarkar, P. B., Mazumdar, A. K., and Pal, K. B., "Test. Res. J.", 22, 529, 1952.
(21) Chatterjee, H., "Science and Cul.", 23, 630, 1958.

Ultra-Violet Hand Lamp

A NEW light-weight hand lamp is the latest addition to the range of ultra-violet lights designed and manufactured by P. W. Allen and Co., 253 Liverpool Road, London, N.1. This lamp (the "Allen" Type A.405) uses two 9 in. long miniature fluorescent tubes as the source of the 3650 A.U. radiation. The light is always ready for use without delay for "warming up" and is stated to be very efficient with high U.V. output for a consumption of only 20 watts. The tubes run cool and have an average life of 5,000 hours.

The complete unit including control gear is available in two forms (a) A.405 for use in factory, mill or laboratory and (b) A.405/P for use on "site". Both models work from 200/250 volt a.c. mains (110/115 volt models are also available). The makers point out that the radiation from the phosphors of the special low pressure fluorescent tubes lie mainly in the 3,400—3,700 A.U. range and in conjunction with the "Woods" glass filter the peak output occurs at 3,650 A.U. There is no radiation below 3,100 A.U. An electro-brightened super purity aluminium reflector is fitted to obtain maximum radiation efficiency.

Long wave ultra-violet lamps have many uses in industry, also in scientific and research establishments including material identification, visual analysis, detection of oil and mildew in textiles, and with fluorescent dye tracers in leak and crack detection, lubrication research, etc



The A-405 ultra-violet hand lamp set up for operation

Silent Mountings for Noisy Textile Machinery

Dampers may be employed as individual point supports or as pads underneath the foundation or between foundation and machine but regardless of the type selected, certain basic relationships must be observed

By P. W. SHERWOOD

HEAVY reciprocating and impact machinery in the textile industry constitutes a special problem in structure-borne noise. Equipment of this type causes heavy vibration which is transmitted to the foundation and floor and the resulting noise is carried by the floor to adjoining rooms. In such situations, the floor itself serving as sounding board, frequently increases the noise level significantly above the loudness of the machine itself.

In combating this serious problem steps are taken to suppress the primary vibrations themselves—where this can be done—and to minimize the transmission of vibrations in the audible frequency range into the foundation. The purpose of this article is to discuss the basic principles involved in solving the special noise problem created by heavy reciprocating and impact machinery and to consider various solutions employed in practice.

By definition, vibration occurs whenever any given point of a system passes through a cycle of repeated reversals in velocity with respect to a fixed reference point. Several types of vibration can be distinguished within the framework of this definition. In the case of reciprocating and impact machinery, the forms most important from the point of view of noise creation are "forced vibration" and "steady state vibration". The former is caused by short-term application of an external force while "steady-state vibration" is imparted to the system after it has been exposed to such external force repeatedly and for sufficient time that a definite and repetitive cycle of motion is established. The forces causing this phenomenon may be either gas pressure which is applied periodically to the piston of reciprocating machinery or the inertia forces associated with moving parts.

The first approach to noise prevention, which can be taken only by the designer of the machinery itself, is to balance forces within the machine such that the amplitude of the resultant overall vibration is minimized, e.g., by balancing the strokes in a multi-cylinder machine. Even with the best-balanced design, some vibration is inevitable in moving machinery and noise caused thereby must be dealt with by the manner in which the machine is mounted on its foundation.

The almost universal approach to eliminating vibration which remains after the forces of machine have been balanced as best possible, is to reduce the magnitude of the force which is transmitted to the machine foundation or at least to minimize the magnitude of the transmitted motion. This is accomplished by mounting the machine on vibration dampers which, in simple terms, are resilient supports for the equipment. Ideally, the resilient mounting rests on completely rigid or infinitely massive foundations. In practice, such foundation does not exist. Accordingly, some passage of vibration through the resilient material into the foundation will occur and will set up resonance here. The object or purpose of dampers must therefore be to minimize the extent of such leaks.

Vibration dampers accomplish this by resisting motion in any direction during the vibration cycle. This is accomplished by a shift in frequency as well as by a loss in total energy. This resistance to motion is due to a mechanical hysteresis effect which is exhibited by all solids but which varies widely in different materials and different structures. For practical purposes, this hysteresis has the effect of converting mechanical vibration energy into potential energy or heat. The commonly employed forms of damper store energy in potential form and dissipate it only to a minor extent. Their useful effect, therefore, is their ability to shift the energy distribution into a frequency range which is less offensive than that of the original noise. To accomplish such readjustment, it is desirable to have resilient members which shift energy to the highest practicable frequency range.

Damper vs. Foundation

Dampers may be employed as individual point supports or as pads underneath the foundation or between foundation and machine. Regardless of the type selected, however, certain basic relationships must be observed between damper and foundation:

(1) Universally, it may be said that air is the best damping material for machinery-caused noise and various arrangements are made in practice to leave air pockets and air spaces at points where the damping material is not called upon to serve a loading function.

(2) It is of greatest importance that damping materials shall not be penetrated directly by rigid parts of the machine structure. This is especially important in the design of fastenings to the foundation. Wherever such passage is inevitable it must be damped by rubber gaskets or by passing the supporting bolt through air, namely through a sufficiently wide hole cut in the damper to avoid direct contact.

(3) Unit loadings on the dampers should be uniform if this is at all possible. If necessary, individual members of the total system of supports may be of different type or size but in such instances special design allowance must be made in advance.

(4) For reasons set forth below, maximum room must be provided in the foundation to allow horizontal expansion of the resilient members.

(5) No rigid connections such as foundation bolts, may pass through

the resilient members in direct contact with these.

Isolators

The resilient members, which serve as noise-suppressive machinery mounts, or dampers, fall basically into two categories: isolators and discrete dampers. Of these, isolators are simpler and for more widely employed devices, and will be discussed first.

Three groups of resilient supports are today in commercial use as isolators. These are (a) rubber (natural and synthetic); (b) metal springs and (c) miscellaneous materials such as felt, sponge rubber, and cork. The latter types of material are used in slab form and are employed almost exclusively to mount machinery. Steel springs and rubber isolators, on the other hand, may be employed either as components of the machine itself or in the foundation or in the mounting to reduce vibration frequency.

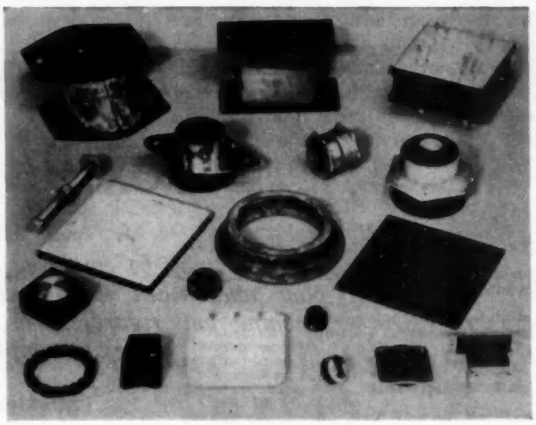
Following are the main areas of application of these three types of isolators.

(1) **Steel springs are most suitable if great static reflection is required under circumstances where temperature or other conditions made rubber unsuitable. However, steel springs have the disadvantage that they transmit high-frequency noise and they must therefore be used in conjunction with rubber mounts when noise is a major problem.**

(2) **Resilient rubber parts are generally preferred under conditions where rubber may be expected to be stable. Advantages include the wide range of available shapes and stiffnesses, high internal hysteresis, low weight, and frequently small space requirements. Furthermore rubber mountings can be installed and replaced with greater ease than is possible for many types of steel spring. To minimize vibration noise the rubber should be subjected to sheer forces rather than to compression and the mount must be designed accordingly.**

(3) **Felt, cork and sponge rubber are generally employed as flat slabs. Cork. is frequently used to support large concrete foundations, as are also lead plates in some cases. Felt is often placed directly under machinery and is favoured because it can be cemented in place and because it is resistant to oil. Use of sponge rubber parallels those of felt in locations where oil drip is not a problem. This material is characterized by outstanding isolator characteristics per unit volume.**

The frequency of vibration is reduced most effectively by use of isolators which have less stiffness in horizontal than in vertical direction. For the support of machines which require high stability, low horizontal stiffness may, however, be undesirable and it therefore becomes necessary to select an isolator by compromise between natural frequency and stability characteristics.



A selection of vibration and noise eliminators used in various textile applications

In the case of impact machines it is essential that the dynamic forces transmitted to the foundation be held at a minimum and that the motion of the foundation be small. This can be achieved by use of relatively soft springs or resilient members in conjunction with a sufficiently large foundation. For such cases, flat dampers are too hard and generally unsuitable.

For damping vibrating noise by resilient interlayers in the foundation, it is desirable to use supports having the smallest practicable cross-section. If necessary, the weight should be distributed over several resilient supporting members, and each such member should be subjected to the greatest unit loading which is compatible with considerations of strength.

The damping efficiency of such pad-like resilient interlayers depends greatly on frequency. Conditions are unfavorable for damping if the wavelength is equal to or smaller than the thickness of the damping materials layer because this will set up vibrations in the damping material itself and thus lead to complete passage of sound. Most effective damping is encountered if the damping layer is thin in relation to the wave length.

Discrete Dampers

In mounting very heavy machinery, resort must frequently be had to more complex mechanical "discrete dampers". These devices can be designed for greater internal hysteresis than is obtained in simpler isolators of the kind described above. Discrete dampers are generally mounted in parallel with the load-carrying isolator such as steel spring or rubber mounting. Several types of discrete damper are common service. Probably the most important is the simple dash-pot in which the machine is mounted to the shaft of a vertical piston which rests on a vertical liquid column through which it passes in the course of its own vibration cycle. A related principle is employed in the magnetic damper, a device in which a conductor attached to the vibrating machinery is forced to pass through a magnetic field.

Drawback of these two simple kinds of discrete damper is their limitation to control of motion in a single straight line. Furthermore, dashpots tend to require fairly frequent maintenance for repair of leaking packing glands while magnetic damper installations are made complex by the need for an electro-magnet or large permanent magnet. More recently, therefore, use has been made of friction dampers in which a dry member slides against another one mounted on springs, and of the air damper in which the vibration of energy is absorbed in the form of work required to push air in or out of a set of rubber bellows through an orifice.

General Rules of Practice

The foregoing principles are the basis on which noise-suppressive mountings for heavy vibrating machines are designed in modern practice. For individual installations, very complex realtionships may be involved and can be satisfactorily resolved only by expert engineering. However, some general practical rules of thumb may guide in solving noise problems associated with heavy reciprocating and impact machinery in installations where relatively simple vibrational problems are created. For such cases, an excellent set of rules has been suggested by the Accident Prevention

department of the Association of Casualty and Surety Companies. These rules, quoted here by permission of the Association, are as follows:

(1) Reciprocating or impact-type machines should usually be rigidly mounted to a massive concrete block.

(2) The concrete block should be vibration isolation mounted from the remaining supporting structure, or preferable, it should be installed on grade. The concrete base may be supported on ribbed rubber, cork or felt vibration isolation pads of suitable dimensions and characteristics.

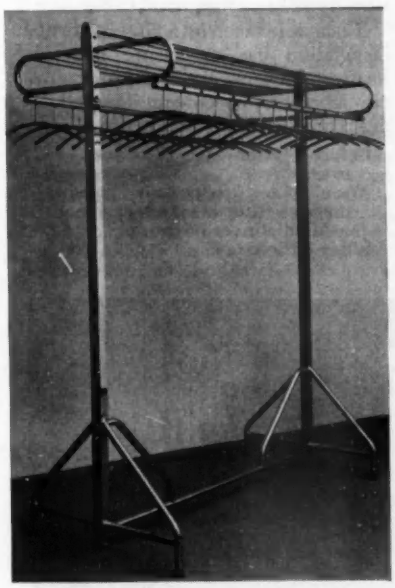
(3) Where possible the concrete base should be so designed that the centre of gravity of the machine and concrete base together will fall in the plane in which the vibration isolation mounts are located.

(4) Felt pads of approximately 1 in. thickness and sufficient area to provide a uniform loading of approximately 15 to 50 lb./sq. in., for different weights of felt, are in widespread use as vibration mounts for looms.

(5) Cork pads of approximately 2 in. thickness and sufficient area to provide a uniform loading of approximately 20 to 60 lb./sq. for isolating concrete bases of machines from the remainder of a building structure.

(6) Felt, cork, and ribbed rubber pads are frequently used under the mounting felt of punch presses, small printing presses, and heavy shop equipment to reduce the transmission of vibration into other parts of the building. It is cautioned that relative motion of some machines may permit misalignments which will result in imperfect products from these machines. Thus, attention should be given to this aspect of a vibration problem before proceeding with a vibration isolation installation.

(7) Where it is feasible to provide a separate foundation on grade for particular machine, it is advisable to separate the machinery foundation from the floor slab to the building with a 2 in. thick asphalt-impregnated glass fibre board which extends a minimum of 12 in. below the base of the foundation. A mastic material may be used to seal the fibre board gap at floor level.



Compact Cloakroom Equipment

A NEW range of cloakroom hanging racks recently announced by Industrial Associates Ltd., 64 - 66 Oxford Street, London, W.1, have been specially designed for (*a*) where space is an absolute criterion in office or factory or (*b*) to meet a demand for accommodating visitors' hats and coats in large and busy industrial organisations.

The "Multilok" racks are made to a standard range of sizes, alternatively they can be made to any required length. The standard distance between hangers is 4 in. centre to centre retained. They may, however, be placed at 5- and 6-in. centres with a price reduction for hangers which become redundant.

The unit illustrated is a double free standing unit accommodating 30 hats and coats. The range also includes single free standing units, wall and ceiling fixing units. The units are finished in aluminium hammertone stove enamel, but other colours are available if required.

Orders for £325,000 of Wool Cloth

Wool textile trade officials were delighted with the way their exhibit was received at the recent British Trade Fair in Moscow. Not only was the stand visited by an estimated one million Russians and leading members of the Soviet Presidium and other notabilities, but the Fair also resulted in the placing of orders worth at least £325,000. Most of this business has gone to mills in the West Riding and Scotland. A spokesman of the National Wool Textile Export Corporation said: "The Soviet buying agencies evidently delayed their purchases until they could see our stand and also inspect samples brought over by representatives of exporting firms. As in the case of other industries which exhibited at the Fair, the Russians have now placed definite orders and it may well be that following the many negotiations which have taken place on the spot in Moscow Russia will now take up all the annual quota allotted to our industry. Even so, the value is very small compared with what we export to other countries and in relation to the vast potential of the Russian market. The Fair has, however, proved most beneficial in facilitating business and has shown the Russian masses what an immense variety of goods we produce. We have whetted their appetite, and from a long-term viewpoint that is much more important than immediate returns."

* * *

Galashiels Tweed Firm's Success

No fewer than nine of the first fifteen places in the five classes devoted to hand-woven tweeds and tartans at the Royal Highland Show, Edinburgh, were won by employees of Andrew Stewart (Woollens) Ltd., Galashiels, and its subsidiary company operating in Orkney and Shetland. In the heavyweight tweed and knee or travelling rug classes, they swept the board.

* * *

Recognition of T.I. Associateship

Notification has been received by the Textile Institute that the Associateship of the Institute "has been recognised by the Government of India for purposes of recruitment to superior posts and services under the Central Government in the field of Textile Technology."

Improved and Versatile Air Filtration Development

In these new filter units complete air seal is claimed to have been overcome by providing a vertical recess on each side of the air filtering frames whereby the filtering cloth is held in tension against a vertical grilled member

NO one really doubts the necessity for air filtration. The fumes and filth carried by the air into our buildings is inhaled into the lungs and deposited on walls, fittings and goods, day in day out, an insidious menace to health.

There is no excuse for permitting this to continue. Modern air-conditioning plant is so simple, versatile and moderate in cost that it functions efficiently year after year and repays the initial outlay time and time again. The filter plant explained here is one of the systems developed by Hall and Kay Ltd., Ashton-u.-Lyne.

Although variations from standard construction are available the PB type represents the standard unit fabricated from a timber frame with rustproof metal reinforcement over which is stretched a double skin of specially woven material developed by the firm after years of experience and experiment. It is extremely durable and gives highly efficient filtration with low resistance. As many units as needed are built into banks to present a complete barrier to dirt-laden air.

Of all scientific tests the efficiency of air filtration is probably presented in a greater variety of methods than any other information, and this can be misleading to anyone who is not highly experienced in this special branch of the air conditioning business. For this reason, instead of planning their own test, Hall and Kay placed the matter in the hands of Shirley Institute, and they report as follows:—

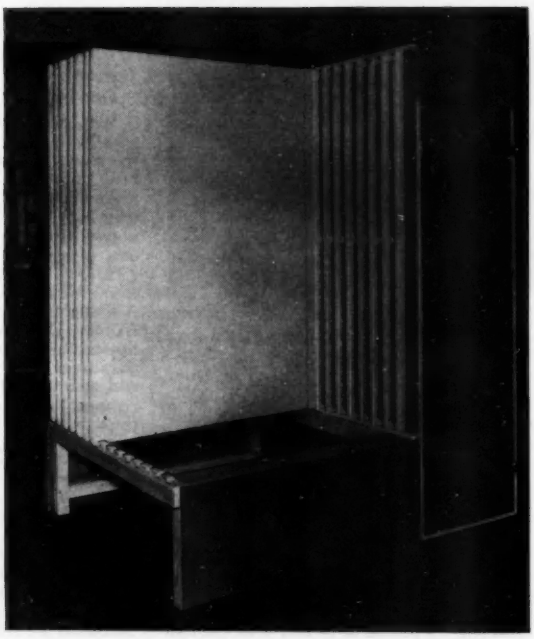
By means of an air compressor, a sample of air was drawn through a filter pad before the filters and after the filters, and the soiling effect on the filter papers used was measured with a densiometer. The unit of air dirtiness, or soiled effect, is termed the "murk," and a guide to its value can be obtained from the accompanying table—

Murks	
0 - 50	Outstandingly clean air
50 - 100	Clean air
100 - 250	Moderately clean air
250 - 500	Fairly dirty air
500 - 1,000	Unpleasantly dirty air

Murks	
1,000	Light fog
3,000 - 5,000	Dense town fog
Over 10,000	"Pea souper" fog

Tests were taken on a filter in normal installation use to ensure true information against the usual procedure of a laboratory specimen. The following representative result is given—

Before Filter—Air dirtiness in murks	459
After Filter (with air passing through filter at standard speed) —Air dirtiness in murks ..	5
Filter Efficiency	99%



This view of Hall and Kay's new improved air filtration unit shows the grille partially completed with filtering frames

It is further considered by Shirley that this filter will improve in efficiency as the concentration of fog increases.

An important feature of this filter is the exceptionally small maintenance requirement. Naturally this varies between districts and according to dirt load, but it is usually found that a gentle brushing of the dirty surface with the vacuum brush provided is all that is necessary to maintain the filter throughout its long life. If reasonable care is taken in this maintenance, the expectation of life of the filter is between 7 and 15 years dependent on dirt loading. After this it is necessary for the filter to be removed section by section and a new filter cover applied.

Hall and Kay say the main problem of complete air-seal has been overcome in a simple but effective manner which, they state offers the following advantages:—

(1) Self-contained units can be quoted for, containing any desired number of cloth seals, dependent on the volume of air with which they are required to deal, and the space available.
(2) At any time, an additional unit or units can be added by linking up with the existing unit or units.
(3) The frames can be removed with ease for cleaning, repair or re-covering purposes.
(4) Being fully interchangeable, those nearest the fan which have usually taken most of the wear can be exchanged with the cleaner ones.
(5) Adjustable clip fastenings on each frame ensure an airtight and quickly sealed joint.

Gift of Automatic Cotton Blending System

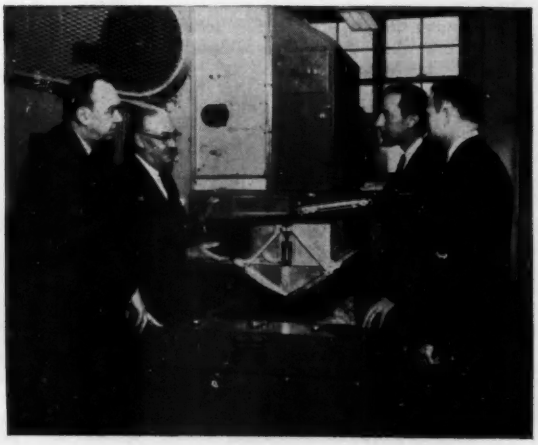
THE new fibre meter automatic weighing conversion system recently installed in the pilot processing laboratory of North Carolina State College School of Textiles by James Hunter Machine Co., North Adams, Mass., is claimed to be a major advance in fibre blending control, and will add considerably to the experimental and training value of the school's processing line.

The Hunter fibre meter automatic weighing conversion system is installed to receive the output of two conventional feeders in the school's textile laboratory, in a pilot production application that affords a facsimile of opening and blending layouts in many cotton mills. It is equipped with a suitable variable speed drive and a single beater at the end of the conveyor. The new equipment will enable the school to demonstrate the unique accuracy which modern blending automation can provide, and the influence of its effects on subsequent processes. It is stated that the system will limit blend variation to $\pm 1\%$.

Commenting on his keen interest in the equipment, Professor Grover (Head of Dept. of Textile Technology) compared quality control research to detective work. "Clues may first show up in an advanced step of the manufacturing process," he said, "that were planted many steps before. We have reports that those mills in which the fibre meter systems are already installed are demonstrating under actual production conditions, that the degree of blending accuracy it maintains is directly related to an increased break factor and reduction of ends down in spinning."

He also noted that the system has other commercial advantages. Because it monitors the blend so closely, more economical fibre grades can be introduced, without sacrifice of quality standards. And the high degree of automation it brings to the opening room can produce important labour savings. "Quality control and economy," he said, "are two problems textile school graduates have to face. There is no point to economy, if it has an adverse effect of quality; and if we cannot reduce costs, we are even more obliged to improve quality, if we are to maintain our competitive position in the world market. We believe we can serve the textile industry best by firmly grounding our men in the importance of these two problems."

Mr. Hunter observed that the textile machinery industry faces a constant obligation to increase the efficiency of its product design. He mentioned the fact that James Hunter, Incorporated has been engaged for some time in a specific programme to increase opening, cleaning and blending efficiency, and to improve quality control at the critical early stages of the textile manufacturing process. "The fibre meter was developed during the early part of this programme," he said. "Other new equipment resulting from Hunter development efforts includes the multi-tuft bale blender, the Cen-Tri-Vac cleaning unit, and the Hunter Stationary screen condenser, which cleans and separates foreign matter as it transports the stock.



Prof. E. B. Grover (left) and Dean M. E. Campbell of North Carolina State College School of Textiles discuss the operating principles of the Fibre Meter automatic weighing conversion system donated by James Hunter, Incorporated with W. F. Leineweber, Jr., general manager of the Hunter plant in Mauldin, S.C., and A. V. Moody, sales manager

Technical Information

The following publications are now available from I.C.I. Ltd., Dyestuffs Division, Blackley, Manchester:—

No. 596.—Dyeing "Terylene" Polyester Fibre: One-bath Azoic Process for Navy Blue, and Black Shades on Loose Staple, Slubbing and Yarn.

No. 600.—Subject Index to Technical Information Leaflets (Dyehouse), Nos. 161 - 599.

No. 608.—Alcian "X" Dyestuffs in Textile Printing: A Tabular Survey.

No. 615.—Washing Coloured Work with Lissapol NK and Fixanol PN.

No. 616.—Lissapol GLN in the "Poensgen Contra-flow Carousel" Washing Machine.

Calaroc T.—A resin precondensate of the trizone type, designed for use on cotton and viscose staple fabrics to impart durable crease resistance, dimensional stability and wash-wear properties.

* * *

Arrow Mill Extensions

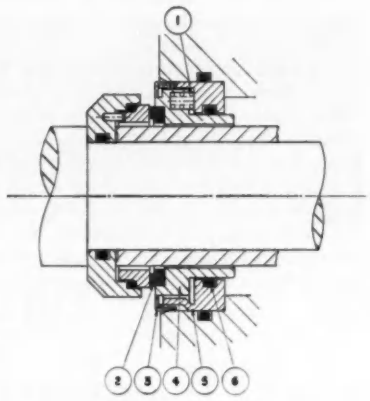
Courtaulds' Ltd. Arrow Mill, Castleton, Rochdale, is to be extended at a cost of about £400,000, and completion of building work is expected by May, 1962. Intended primarily for extending the development of Courtaulds' fibres, it demonstrates the company's confidence in Lancashire yarn spinning and in the function of Arrow Mill. The extension includes a new canteen and other welfare facilities. Arrow Mill has been operated by Courtaulds since 1934 and Mr. G. Waggett is the general manager. A new building opposite the mill (the Textile Development Unit) was opened in 1957.

Compact Seal for High Speed Shaft Sealing

FOR high-speed shaft sealing applications where axial space is at a premium, Flexibox Ltd., Nash Road, Trafford Park, Manchester 17, have developed a new mechanical seal—Type DD. This new seal, it is stated, can cope with peripheral speeds up to 15,000 f.p.m. pressures up to 1,000 p.s.i.g. and temperatures up to 500° F. The seal possesses several important features of interest to equipment designers. For example, all the components are replaceable and worn parts can either be replaced completely or reconditioned without destroying the whole seal. In addition the overall length can be specified to close tolerances. The complete seal unit is designed as a press fit in its housing and the smooth clean profile of the outside diameter and rubbing face ensures accurate leak-free fitting.

The Type DD is a face-type balanced mechanical seal of multi-spring design. It consists essentially of a housing which carries a resiliently mounted stationary rubbing face assembly consisting of a body (1) insert (1B) and resilient packing (2). Face loading is provided by a number of small springs (7) arranged around the flange of the stationary seal ring body (1A). This ensures close control and uniform application of the face contact pressure. The rotary mating face should preferably be resiliently mounted.

Three variants of the basic design—are available—O-ring fitted, chevron packed and "reverse balanced", respectively. In addition each basic type is available in two ranges of axial tolerance and three face loadings. This permits a very wide range of applications to be successfully handled. The standard range of sizes covers shaft diameters from ¼ to 8 in. but larger diameters can also be manufactured. Typical applications include fuel pumps, gear boxes, liquified gas pumps, air and gas blowers, hydraulic pumps and motors, chemical pumps, agitators, mixers and compressors and fluid transfer mechanisms, etc.

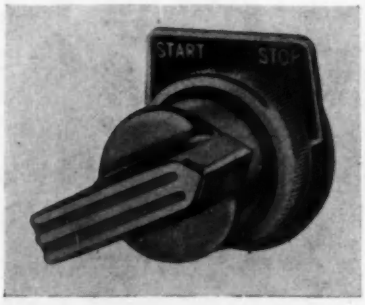


(1) Springs, (2) Stationary seal ring insert, (3) Housing cap, (4) Stationary seal ring body, (5) Seal housing and (6) Stationary seal ring packing

New Control Equipment

SQUARE D Ltd., Cheney Manor, Swindon, Wilts, announce a new control unit. This addition designated Class 9001 Type TS is an oil tight selector switch equipped with an operator the physical dimensions of which allows easy operation by operators wearing gloves. The attractive chrome plated knob will add eye appeal to any control unit in addition to allowing safe, positive operation.

New additions to their Class 9007 type AW oil type limit switch range are also announced. The additions are two unique operating arms. The first is an adjustable length roller arm, adjustable in length from 1 to 4 in. The use of this arm will eliminate wasteful setting up modifications and conserve design labour. The second addition is a roller arm infinitely adjustable through 360°. The arm can be adjusted to any angular position by rotating the knurled adjusting micrometer dial on the spindle of the arm. A graduated scale on the spindle is clearly marked in 20° graduations for easy setting of the arm position. One complete turn of the micrometer dial moves the arm through 20° from one graduation mark to the next. A reference mark is located on the moving portion of the arm and the micrometer dial is provided with a position indicator. In consequence accurate presetting and subsequent adjustment of the arm to any angular position is easily accomplished.



Class 9001 Type TS control unit

Class 9007 limit switch with radial adjustment arm

DETERMINATION OF STIFFNESS OF CLOTH. British Standards Institution, Sales Branch, 2 Park Street, London, W.1. (price 3*s.* each.).

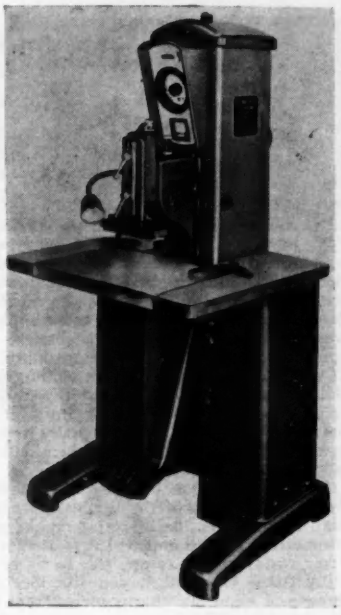
"Handle" and "drape" in a fabric can be readily appreciated but may not be so easily defined and measured by the layman. Both characteristics depend on the stiffness of the cloth: fabrics which feel stiff are described by technologists in terms of flexural rigidity, and those which look stiff in terms of bending length. The significance of these terms is explained in B.S. 3356. The procedure specified depends on a mathematical analysis of the bending of a cantilever under its own weight. The method is suitable for fabrics which do not curl or twist badly when cut into small pieces, and do not show a noticeable time effect when allowed to bend under their own weight.

* * *

£3¼ Million Order

Stone-Platt Industries Ltd. confirm that a contract has been signed in Moscow for textile machinery to the value of £3¼ million. The order came at the close of the British Trade Fair and covers two complete "New Continental" worsted spinning plants totalling 42,000 spindles, with dyeing and finishing machinery. The order has been negotiated by Platt Bros. (Sales) Ltd., in conjunction with Prince-Smith and Stells Ltd., both members of the Stone-Platt group. The spinning machinery covered by this contract which will be manufactured in the group's works at Accrington, Keighley, Leeds and Oldham, will amount to approximately £1¾ million.

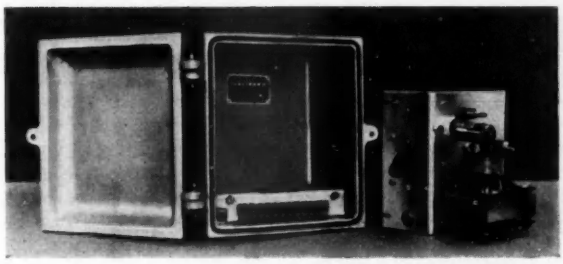
High Frequency Welding of Plastics, etc.



The new "Acme" No. 7 - 1 kW. machine

FROM packaging to rainwear—this new "Acme" No. 7 high frequency plastics welding machine, with a power output rating of 1 kW, has been introduced by H.F. Industrial Services Ltd., 317 High Road, Wood Green, London, N.22 in response to the demand for a "small" machine. For those contemplating welding for the first time it is a "maid-of-all-work", making possible the acceptance of work covering a very wide field of applications. For the larger organisation its versatility allows it to be used as a "fill-in" to carry out work for which the larger machines may be uneconomic. It is a free standing, vertical machine. Making use of normal "Acme" high frequency practice, it has a remarkable freedom from "flash" and, the incorporation of stabilised metal rectifiers is said to ensure many years of trouble free use without loss of production time.

As no "warming-up" period is required the "Acme" can be used immediately after switching on. It may therefore, be switched off for meal breaks and the life with a resultant economy in oscillator valve life and electric current. It has an overall height of 64 in. with a table height and width of 33 in., table depth being 14 in. It will carry out a tear seal weld of 60 in. long by $\frac{1}{16}$ in. wide on double thickness 0·018 in. p.v.c. or 36 in. on double thickness 0·004 in. p.v.c. and has a weld area of 6 sq. in. on double thickness 0·018 in. p.v.c. The h.t. contactor is rated at 16,000,000 operations which corresponds to some 10 years full usage and the only really consumable part is the oscillator valve which the makers guarantee for 1,500 hours.



Sensitive Continuous Level Indicator

PRESENT manufacturing processes call for accuracy and speed of measurement where the contents of tanks, hoppers and similar type containers are concerned if production and safety are not to be jeopardised. An extremely sensitive piece of equipment—the "Contimitor"—announced by Electronic Machine Co. Ltd., Mayday Road, Thornton Heath, Surrey, is a capacity operated monitor which provides a continuous indication of level on a meter or recorder and it owes its stability and freedom from drift to a circuitry which employs a crystal oscillator with full temperature and mains compensation. A matched transmission line connects the instrument to its probe or transducer and cable lengths of up to 100 yds. can be used without loss of stability, the line being unaffected by the presence of metal girders and the like along its run.

A capacity change of 10 pica farads gives a reading over a range of nil to full scale on a 1 milliamp meter, or a voltage change of 5 volts is available. This voltage is negative going and is relative to earth, so that a d.c. amplifier can be driven. In cases where extreme sensitivity is required provision can be made to give ·03 pica farads for 1 milliamp change in output. If it is used in applications such as continuous level monitoring in tanks, where high minimum values of capacity are encountered, with relatively large changes in capacity as the level rises, provision is made for tapping down the coil at the probe end.

The "Contimitor" is housed in a robust cast aluminium case that will withstand heavy industrial usage. A few uses of the instrument include continuous level monitoring or control of fluids and solids in tanks or hoppers, foam detection, vibration detection and measurement, machine control or as a safety device on other machines.

New Dust Respirator

THE protective equipment division of Martindale Electric Co. Ltd., Westmorland Road, London, N.W.9 has introduced a new high efficiency dust respirator which, it is stated, provides protection against dusts as fine as 0·5 micron and smaller. It is known as the Martindale heavy duty respirator.

The design team engaged in the design and testing of the new respirator, has given particular attention to weight, efficiency, easy breathing and comfort. The face piece and filter box are made from lightweight hygienic plastic materials and the complete respirator weighs only 4½ ozs. The triangular shape of the filter box ensures unimpaired vision. The plastic face piece can be moulded with the fingers to effect a comfortable seal on any shape or size of face.

The efficient design of the filter box, containing the Ultron (ultra-micron) filter, ensures an initial resistance to breathing of 0·65 in. water gauge at 3 cu. ft./min., at the same time providing highly efficient filtration. The filter also has long life. It is pointed out that many nationalised and major industries are using this heavy duty respirator with the Ultron filter to give adequate protection to their employees where fine dust hazards exist.

Simplified Calibration for New Thermometer

BRITISH ROTOTHERM CO. LTD., Merton Abbey, London, S.W.19, have produced what they say is the first British bi-metal thermometer specially designed so that it can be re-calibrated without calling in a skilled technician. Named the "Zero Re-set," the thermometer was originally planned for installations in countries where there is a high proportion of unskilled labour and where waiting for skilled men to re-set a thermometer can cause long delays. It is now anticipated that this instrument will be equally useful in this country on occasions when skilled labour is not readily available.

The re-calibration procedure is simple. At the lower back of the vertical head of the thermometer is a countersunk instrument screw stamped "RS - Re-set." After removing the screw, two turns of a 2 BA Allen key will loosen the locking screw and allow the thermometer stem to be rotated. This rotation moves the pointer and allows adjustments of up to 50% of the scale range. A stop is incorporated in the locking device which makes it impossible to damage the instrument. The thermometer is at present available with 2½ in., 4 in. and 7 in. dials in the vertical pattern in all standard temperature ranges. Horizontal patterns of this thermometer will be available shortly.

Loosening the locking screw with a 2 BA Allen key, allowing the thermometer stem to be rotated

Rotating the thermometer stem to re-calibrate British Rototherm's new thermometer

Rapid Single-Handed Stacking

SINGLE-HANDED stacking of cases and skips and other packages is possible with the new skip and case stacker developed by Lodematic Ltd., Clitheroe, Lancs. As will be observed from the photograph the thin taper-type forks insert between case battens, allowing stacking to be effected without need for stillages or pallets. A heavier duty model is available for beams, and can be four-directional for use in narrow gangways and stacking at right angles to the direction of travel. Used in conjunction with racks of slotted angle it can position loads into the racks or remove them quite easily, the skips, cases or beams being located on cross bearers with room underneath for the forks.

The high-speed hydraulic system is powered by "plug-in" mains electric motor or battery motor, and frame and ram automatically telescope as the forks lower. The Mk "S-C" (shown) lifting up to 6 ft. is only 5 ft. 8 in. high when the forks are lowered, allowing movement through low doorways or into goods lifts. The relatively low unladen weight of these stackers allows use on floor loadings or in limited space where larger machines cannot be used. A detachable platform is available where it is desired to lift several lighter loads at a time, such as a number of doffing skips or cloth pieces. Other models are available with up to 14 ft. lift.

A New Hypochlorite

A new compound, lithium hypochlorite, marketed by the Chemical Sales Division of Pfizer Ltd., Sandwich, Kent, is now available from bulk production. This material, a non-deliquescent solid in free-flowing granular form, is claimed to have the highest available chlorine figure of any chlorine bleach (121%). The company state that it is readily soluble in water and gives no precipitation with soaps and detergents, or in hard water. Like all hypochlorites it has its maximum effectiveness in the neutral range, and does not begin to lose its effectiveness until a pH of about 11 is reached. In addition there is no risk of chlorine being produced at higher pH levels.

THE TEXTILE
COLOURIST & FINISHER

Self-Smoothing Fabrics: Chlorine-Retention Damage

Faced with a rather perplexing —and increasing—choice of the "best" resin, the finisher would be well-advised to seek the advice and guidance of those with expert knowledge and long experience of the subject

By J. T. MARSH

WHEN crease-resisting goods were first merchanted about twenty-five years ago, in 1932, it was the universal practice to employ urea-formaldehyde condensation products; it was well known that the treated fabrics had a tendency to absorb chlorine from hypochlorite solutions, but it was also known that the chlorine was loosely held and could be removed by hot rinsing in the home and by the use of the common anti-chlor in the laundry. Furthermore, with all the treated goods there was the advice "wash as wool," and it seemed reasonable then to assume that no one would use hypochlorite solutions when washing woollen goods.

Complaints from the use of hypochlorite were too few to merit serious consideration or to warrant special attention in the finishing plants. In any event, the home use of hypochlorites was quite uncommon in England, and laundry practice was under careful control; the British Launderers' Research Association stipulated 3 to 5 grains of available chlorine per gallon (i.e. about 0·004 to 0·006%) not above 60°C. at a bath ratio of 6 : 1. In continental Europe, the use of hypochlorite in the home was an old custom but surrounded by precautions established by many years of disastrous empirical experiment; moreover, the rather dangerous hypochlorite was giving way to the safer peroxide and other per-salt preparations.

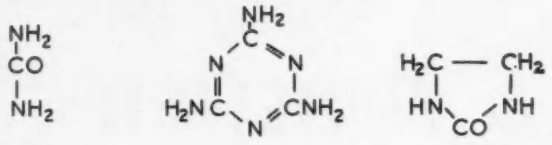
Immediately prior to world war II, and again afterwards, there were many attempts to popularise the use of melamine-formaldehyde instead of urea-formaldehyde for crease-resisting textiles. The advantages were not immediately apparent, quite apart from the disadvantage of higher costs, and even after the lapse of many years there seems to be no likelihood of melamine replacing urea. However, in the search for properties which could be turned to advantageous propaganda attention was drawn to the fact that melamine-formaldehyde absorbs less chlorine than does urea-formaldehyde, and in due course this became an important selling point, not only with the resin manufacturers but also with textile merchants who were anxious to get ahead of their competitors.

It was most unfortunate that the advocates of the use of melamine-formaldehyde did not appreciate that although it absorbed less chlorine from hypochlorite solutions than did urea-formaldehyde, yet the absorbed chlorine was much more firmly held; because it is more difficult to remove, it is much more dangerous in the treated fabric, which, when ironed, will liberate hydrochloric acid and destroy the cellulose. The problem has become quite acute in certain countries because of the invitation to use hypochlorites on a widespread scale, and particularly in countries which rarely use hypochlorites for commercial bleaching! The problem is not one of chlorine-retention but of the damage which may arise subsequently when the goods are ironed. The term "chlorine-retention-damage" has been employed by Bacon, Smith and Hughes (Am. Dyes. Rep., 1958, **47**, 259) and appears very appropriate.

In a useful paper on the application of hydrophobic melamine-formaldehyde products, it was pointed out by Landolt (J.S.D.C., 1948, **64**, 93) that textiles which are coloured with dyes sensitive to chlorine showed greater resistance to bleaching when protected with amino-aldehyde resins; melamine-formaldehyde showed greater protection than urea-formaldehyde. His paper also showed that treated fabrics will absorb 5 to 6% of chlorine. Most finishers, however, would probably prefer to be without this alleged advantage. In a general review of the crease-resisting process, it was stated by Creegan (Am. Dyes. Rep., 1946, **35**, 514) that the weakness to chlorine was a weakness of the process, and this type of thinking was emphasised by Thomas (*ibid.*, 1949, **38**, 413), who suggested that chlorine resistance was the greatest need in resinous condensation products for crease-resistance.

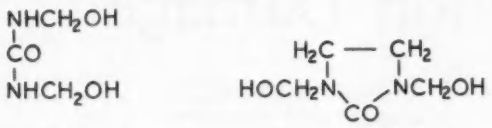
It is now clear that the American chemical manufacturers were aware of the situation which had been created, for in 1950-1951 a new type of chemical compound began to appear, namely dimethylol cyclic ethylene urea (cyclic ethylene urea itself had been known since 1886), and its ability to absorb chlorine was much less than that of urea-

formaldehyde or melamine-formaldehyde, as may be seen from the formulae.



Urea Melamine Ethylene urea

The superiority of cyclic ethylene urea is perhaps seen to better advantage by considering the dimethylol compounds; with dimethylol cyclic ethylene urea there are no nitrogen sites available for the chlorine, but with dimethylol urea the imino-nitrogen is sensitive. Similar considerations apply in the case of the treated fabrics.

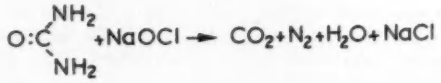


Dimethylol urea Dimethylol ethylene urea

With the rise of the non-iron cotton shirts about 1954, there was an increased manufacture of resin-treated white cottons and as a result it was found that, although the chlorine-retention of goods treated with melamine-formaldehyde was less than that from urea-formaldehyde, yet the chlorination produced a pronounced yellowing and this remains the chief disadvantage of goods treated with melamine-formaldehyde.

It is evident that the chlorine absorption of the urea formaldehyde condensates in the fabric will depend to a large extent on the molecular ratio of the reagents; for example, the chlorine absorption of monomethylol urea will be greater than that of dimethylol urea.

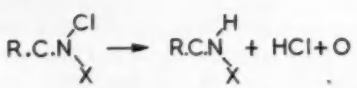
When urea-formaldehyde resins are treated with hypochlorite solutions there is some decomposition in the following manner.



In addition, there is some formation of addition products of the chloramine or chloramide type.

Melamine resins generally form the addition products only, and there is little loss of weight on chlorination.

Unless steps are taken to remove the chlorine from resin treated goods which have been in contact with hypochlorite bleach liquors, subsequent heat treatment can bring about a certain amount of fibre damage, and it may be that the breakdown of the chloramine or chloramide occurs in the following manner.



It is generally assumed that the hydrolysis of the fibre takes place by acid attack but there is little accurate published work on this aspect of the problem.

Test Methods

One of the first attempts to place the absorption of chlorine by resin-treated goods on a sound rational basis was made by Atkinson and Sargent (Am. Dyes. Rep., 1949, **38**, 743) but the most important publication on this topic is that by Nuessle and Bernard (*idem.*, 1950, **39**, 396), who covered the field of investigation in a remarkably competent manner. The technique adopted was to chlorinate the treated and washed rayon fabrics at the appropriate temperature, chlorine concentration, and bath ratio for the specified times, followed by rinsing.

Samples were placed in a flask with 5 c.c. of glacial acetic acid, 5 c.c. of distilled water, and 3 c.c. of freshly-prepared solution (30%) of potassium iodide; a convenient size of sample was a disc about 20 sq. cm. in area. The flask was stoppered and shaken for 15 mins. The liberated iodine was titrated in presence of the fabric with N/40 thiosulphate, using starch as an indicator. Urea resins liberate about 95% of their retained chlorine in 15 mins. but melamine products only liberate about 80%, so that two titrations may be necessary. The calculations were based on the following formula.

$$\text{Cl}\% = \frac{V \times N \times 0{\cdot}0177 \times 100}{W}$$

where V is the total volume of thiosulphate, N is the normality of thiosulphate (0·025), and W is the dry weight in grams of the sample. The chlorine is estimated as the actual percentage of chlorine and not as available chlorine.

Three resins were examined in the course of the investigation, namely urea-formaldehyde (UF), melamine-formaldehyde (MF), methylated melamine formaldehyde (MMF), and dimethylol cyclic ethylene urea (DMEU), with the results shown in Table 1.

Table 1. Available Chlorine in Bath

Resin	0·005%		0·05%		0·10%		0·40%		1·00%	
Solids Applied	Cl%	Str.	Cl%	Str.	Cl%	Str.	Cl%	Str.	Cl%	Str.
Untreated ..	0·02	40	0·05	41	0·03	40	0·06	39	0·05	37
15% UF ..	0·11	45	0·43	42	0·75	15	2·11	2	3·52	2
15% MF ..	0·18	46	0·53	40			2·60	2	4·70	2
12% MMF ..	0·08	44	0·26	45	0·95	39	2·18	2	3·57	2
8% DMEU ..	0·06	42	0·18	40	0·26	39	0·32	40	0·30	35

It will be seen that the range of chlorine concentrations in the bath covers from one-half the usual concentration of laundry practice to one hundred times that amount; at 0·005% chlorine, the chlorine retained by the fabric and the loss in strength after heating to 200°C. are both negligible in spite of the rather high bath ratio of 30 : 1, and even at 0·05%, which is five times the recommended concentration, there is no marked loss in strength after ironing. With increasing concentration of chlorine in the bath, the UF and MF resins take up increasing amounts of chlorine, but the DMEU remains constant at about 0·3%.

In general, the damage from ironing does not occur until the retained chlorine reaches 0·4 to 0·5%, but after the level reaches 2% there is a complete destruction of the fabric on ironing. Discolouration on chlorination occurred with the melamine-formaldehyde resins when subjected to baths of 0·1% chlorine and higher; UF and DMEU remained white in the baths. When heated, however, fabrics subjected to the 0·4% chlorine bath turned deep brown with UF and medium brown with MF. Whereas most laundries would not use chlorine concentration in excess of 0·04% on the fabric, or 0·01% in the bath, there is often "an amazing lack of restraint" in home laundering.

With regard to the concentration of the resin, Nuessle and Bernard showed that this was far less critical than the concentration of chlorine in the bath; the melamine resins

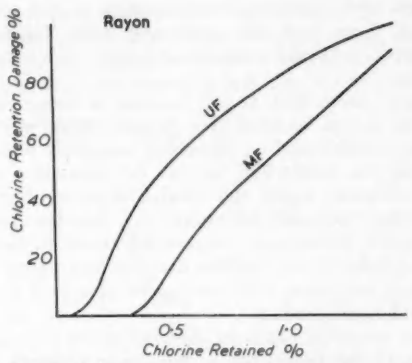


Fig. 1. Relation between chlorine retention and chlorine-retention-damage, according to Nuessle

tended to reach their maximum chlorine absorption around 10%, but the urea resins, including DMEU, showed increased chlorine absorption with increased resin concentration though not in direct proportion. The bath ratio, however, is of considerable consequence in chlorine retention and subsequent damage on heating (see Table 2).

Table 2. Bath Ratio

Resin	10:1 Cl%	10:1 Str.	30:1 Cl%	30:1 Str.	50:1 Cl%	50:1 Str.	150:1 Cl%	150:1 Str.
Untreated	—	—	—	—	—	—	—	—
15% UF	0·43	42	1·03	8	1·23	5	1·62	2
15% MF	0·35	48	1·03	19	1·18	14	1·36	8
12% MMF	0·26	46	0·60	40	1·13	22	1·23	7
8% DMEU	0·15	49	0·23	47	0·23	44	0·28	43

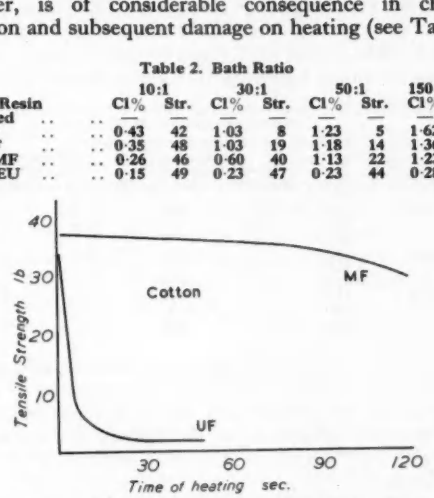


Fig. 2. Effect of time of heating chlorinated fabric at 180° C., according to Nuessle

With the exception of DMEU, it will be seen that there is a sharp increase in chlorine retention as the bath ratio increases. The effect of temperature on ironing for 30 secs. was negligible up to 120°C., but at 150°C. the samples containing UF (and subsequently exposed to hypochlorite) showed definite charring and losses in tensile strength. DMEU exhibited no discolouration even at 200°C. but this was no doubt due to low chlorine retention rather than to any superiority in heat resistance.

With regard to rinsing, it was found that although the number of rinses was only of modest consequence in the removal of chlorine, the temperature of the rinsing water had a much greater effect (Table 3).

Table 3. Rinsing Temperature °C

Resin	21 Cl%	21 Str.	38 Cl%	38 Str.	71 Cl%	71 Str.	93 Cl%	93 Str.
Control	0·11	34	0·07	48	0·09	46	0·11	35
UF	1·79	2	1·40	2	1·00	10	0·11	25
MF	1·69	15	1·10	24	1·41	30	0·85	32
MMF	1·55	15	1·58	16	1·62	12	0·86	33
DMEU	0·40	36	0·30	45	0·35	43	0·16	38

At the higher temperatures there is some decomposition of the compound between the resin and chlorine, and this is noteworthy with urea-formaldehyde. It appears to be recommended laundry practice in the U.S.A. to rinse at about 75°C., but all laundries may not follow this suggestion.

This very important paper by Nuessle and Bernard shows quite clearly that small amounts of retained chlorine are harmless but that the margin of safety is rather small. This was the first of a series of studies on a problem which has become somewhat exaggerated as a result of intensive propaganda which has recoiled on the heads of those who originated it; a situation was created which got out of control. The work of Nuessle and Bernard referred to rayon only, and the catalysts they examined were ammonium chloride, diammonium phosphate, and organic amine hydrochloride.

Wachter, Davison, and Knight (Am. Dyes. Rep., 1953, **42**, 261) devised an accelerated test for chlorine absorption which gave greater losses than from twenty-five repeated launderings; they also observed that the degradation is activated by exposure to light. This type of investigation was extended by Wham, Mack, and Lynn (*idem.*, 1953, **42**, 285, 328, 360, 389 and 421), whose publications contain many data confirming previous conclusions. The series of papers concluded with a suggested test of stirring a sample at 60°C. for 10 mins. in distilled water and then rinsing for five periods of 30 secs., drying, and then exposing in a Fadeometer for 40 hours, followed by pressing at 135°C. for 80 secs. under an iron which is lifted after every 10 secs. of contact.

It seems, however, that the ethylene urea resins were originally evaluated by a multiple washing technique in which the amount of chlorine was naturally limited to reasonable quantities, corresponding to the American standard test AATCC 36/52, but this was later supplanted by AATCC 69/52 with much greater amounts of chlorine as a rapid assessment of the value of resins for cotton. It has been stated by Borghetty (Am. Dyes. Rep., 1958, **47**, 509) that the amount of chlorine on the fibre is fifty times greater and may amount to 12·5%; had this test been in use prior to the advent of dimethylol ethylene urea this compound would never have been accepted by finishers, yet the billions of yards successfully treated contradict its evaluation by an accelerated test which bears no relation to requirements and is quite unrealistic.

The tentative test (Am. Dyes. Rep., 1959, **48**, 5), which is largely utilised in the U.S.A., is first to wet the sample in fifty times its weight of distilled water for 3 mins. at 70°C., drain and allow to cool to room temperature, after which it is placed in fifty times its dry weight of a solution containing 0·25% available chlorine at pH 9·5 and 25°C. for 15 mins. with frequent stirring. The sample is then removed, drained, and passed through a household wringer, after which it is given a series of six separate rinsing processes in fifty times its weight of distilled water at 21 to 27°C. for 2 mins., with draining and mangling after each rinse. The sample is then air-dried and conditioned at 65% R.H. and 21°C., after which it is subjected to the scorching test for 30 secs. at 185°C. The samples are again conditioned for at least 16 hours before measuring the tensile strength.

In considering the substantial amount of work which has been done in the U.S.A., it should not be forgotten that it is common practice to chlorinate the public water supplies to a much greater extent than in Europe; hence there is some slight absorption of chlorine on laundering even without the addition of extra hypochlorite solution.

In reviewing the work of a committee of the AATCC on chlorine retention damage for 1953-56, some of the

many difficulties have been mentioned by Walmsley (Am. Dyes. Rep., 1957, **46**, 237). It has proved most difficult to correlate results found in the laboratory with the performance of the fabrics in use; furthermore, poor correlation was found in an inter-laboratory test. Individual laboratories reported wide variations in the results according to the source of the rinsing water which may amount to 300 times the weight of the fabric; some impurities could act as anti-chlors, or minute amounts of alkali could neutralise the HCl formed on heating. Many laboratories have reported that the addition of acetic acid to the rinsing water generally increases the chlorine-retention-damage. When excessive amounts of chlorine are used (over 0·01%), damage can be disastrous even after a few launderings, for there is actual chlorine degradation as well as damage due to retained chlorine. Many of the cotton fabrics used in this test were treated with a mixture of equal parts of melamine-formaldehyde and dimethylol ethylene urea; this technique will be discussed later, but the chief object of adding melamine is firmly to hold the small amount of chlorine absorbed by cyclic ethylene urea and so reduce the possibility of chlorine-retention-damage to an absolute minimum.

Avoidance of Damage

Howard (Text. Res. J., 1956, **26**, 124) has examined the effect of sodium bisulphite to remove any chlorine which may be retained by crease-resisting cotton goods. There appears to be a slight loss in crease-recovery which is least in those samples treated with DMEU. Retained chlorine alone, without any anti-chlor, also causes some fall in the recovery figure. Treatment with hypochlorite followed by bisulphite brings about a slight reduction in the weft strength of cotton goods treated with UF and with DMEU, but not in the case of MF; chlorination alone causes some loss in weft strength of fabrics treated with UF and with MF.

The use of anti-chlors is not common in American laundries, and it is often assumed that they use substantial amounts of chlorine which produce unfortunate effects on resin-treated goods; the recommended amount of chlorine is 0·01%, according to the American Institute of Laundering. The severity of the laundry treatment of crease-resisting goods is due to other conditions, as stated by Borghetty (supra), namely 30 mins. at about 70°C., followed by an acid sour at pH5. There is growing evidence that with amino-aldehyde resins, and more particularly with cyclic ethylene urea, the sensitivity to acid may break open the structure and liberate nitrogen sites which can then absorb chlorine; hence there is an increasing tendency to use buffer substances, like the salts of zinc or magnesium, which can act as catalysts in the final condensation of the resin and remain as oxide or hydroxide in the fabric.

Wannow (Text. Prax., 1955, **10**, 1248) made an interesting series of observations on the effect of the catalyst in this connection; the results show no great differences with urea-formaldehyde, but with melamine-formaldehyde the nature of the catalyst is of some consequence. Zinc chloride and magnesium chloride give rise to the least damage as shown by yellowing; as the absorption of chlorine is unaffected by the catalyst, the beneficial effects must be due to neutralisation of any hydrochloric acid which is formed by the metal hydroxides formed in the fibre; even a pre-treatment with soap and soda before chlorination does not impair the benefits conferred by the use of metal salts as compared with ammonium chloride or ammonium nitrate. Wannow also pointed out that the extent of yellowing decreased with increasing condensation of the resin, and also that there was less yellowing with samples from methylated methylol melamine than from methylol melamine.

It would seem that as the reaction is never complete, there will always be some free groups, either methylol or methyoxymethyl, and as the latter are more resistant to hydrolysis the result will be less nitrogen-sites available for the chlorine; hence the relative absence of yellowing with methylated-methylol-melamine. Similar considerations apply to the necessity for thorough condensation of the resinous product, for otherwise some nitrogen-sites will not be blocked and more chlorine can be absorbed than by a fully-condensed product.

Special attention has been directed to the impact of the alkalinity of the fabric before the crease-resisting process by Stam, Poon, Spangler and Underwood (Text. Res. J., 1956, **26**, 960). With mercerised cotton which has been neutralised with a weak acid such as acetic acid as a separate step, the alkalinity may be 0·06% as NaOH; 0·15% alkali represents the results from a high speed mercerising range with efficient washing, but this may be as high as 0·3% alkali if the plant is not operating very efficiently. A comparison of chlorine-retention-damage was made with MF and DMEU and with equimolecular amounts of two catalysts, an amine hydrochloride and magnesium chloride (Tables 4 and 5).

Table 4. Melamine Formaldehyde

Alkali	Cure	Amine hydrochloride		Magnesium chloride	
		Recovery	Damage	Recovery	Damage
%	°C	mm.	%	mm.	%
0·06	140	28	85	28	95
	160	31	30	30	25
	180	32	5	33	0
0·15	140	29	70	27	100
	160	31	25	31	35
	180	32	0	33	0
0·30	140	22	100	25	100
	160	23	100	29	70
	180	28	100	31	15

Melamine-formaldehyde shows losses in breaking load ranging from 0 to 100%; at the lowest temperature of curing the damage is uniformly high and the crease-recovery is poor. At higher temperatures, the damage is relatively low at 0·06 and 0·15% alkali but becomes higher at 0·3% alkali in the fabric.

Table 5. Dimethylol Ethylene Urea

Alkali	Cure	Amine hydrochloride		Magnesium chloride	
		Recovery	Damage	Recovery	Damage
%	°C	mm.	%	mm.	%
0·06	140	32	30	31	15
	160	32	10	33	15
	180	33	0	34	10
0·15	140	32	50	28	65
	160	33	5	31	35
	180	34	0	34	10
0·30	140	21	—	21	—
	160	21	—	22	—
	180	22	—	26	—

With DMEU the losses in breaking load range from 0 to 85%, but with the highest degree of alkalinity in the fabric, the resin washed out during the chlorination test. Magnesium chloride appears more effective in maintaining crease-recovery at high fabric alkalinity with both treatments. It is possible to compensate for high fabric alkalinity by increasing the amount of catalyst, but it seems very common for the alkalinity of the fabric to be undetected; the wisest plan is to include an acid sour after the mercerising process.

Zinc nitrate as a catalyst for dimethylol ethylene urea has been shown to have some benefits in connection with chlorine-retention-damage, if the final condensation is efficient, according to Bacon, Smith and Hughes (Am. Dyes. Rep., 1958, **47**, 259). The absorption of chlorine is low because of the relative absence of free positions, and any

hydrochloric acid formed will be buffered by the basic zinc residue; the resistance to household washing, including chlorination, will probably be much better than the resistance to repeated commercial laundering.

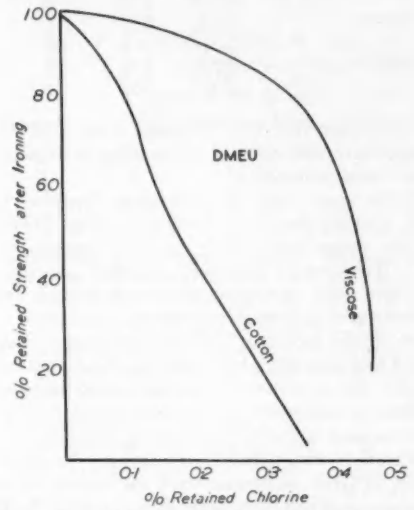
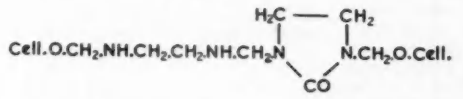


Fig. 3. Comparison of chlorine-retention-damage of cotton and rayon, according to Nuessle

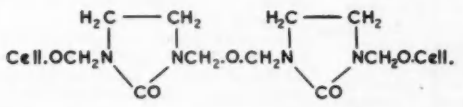
Although many finishers take the view that as many thousands of billions of yards of fabric have been treated with amino-aldehyde resins without giving rise to damage later, any trouble which occurs is due to those who depart from recommended procedures, yet there are more who have to bow to the demands of a hypochlorite-happy public created by unwise advertising. The problem can be solved, but at a price which the public must pay.

Resin Buffers

Although DMEU gives remarkably good crease-recovery, the treated goods are susceptible to acid hydrolysis in a rather peculiar manner whereby chlorine absorption is increased without loss of recovery; hence it is important to neutralise the catalyst immediately after curing and to avoid acid during laundering. Many chemists are of the opinion that the acquired chlorine-absorption after the original treatment is due to cleavage of the ethylene urea ring structure; this has been discussed by Mosher (Text. Res. J., 1959, **29**, 88), Frick, Kottes and Reid (*ibid.*, 314) and Petterson (*ibid.*, 840).



On the other hand, Smith (Am. Dyes. Rep., 1959, **48**, No. 8, 49) considers polymers of DMEU may give longer linkages of the following type.



The breakdown of these ether links on storage would explain the later chlorine absorption without postulating any cleavage of an apparently stable ring structure. The various views have been reviewed by Marsh (T.M., 1961, **87**, 153).

Since about 1950-52 several new chemical compounds have appeared for the crease-resisting process and finishers have not been slow to explore the possibilities of mixtures, to make the best of both worlds, in just the same way as manufacturers have used mixed fibres. For example, Jennings (Text. Res. J., 1955, **25**, 20) has stated that a blend of 2·25 molecular proportions of dimethylol ethylene urea to one molecular proportion of polymethylol melamine, preferably as a condensation product, gives good results when properly cured; chlorine retention is negligible and there is no yellowing. This is probably the process described in USP 2,690,404, which refers to the tendency of the methylol melamines to retain chlorine and turn yellow, and of the dimethylol ethylene ureas to impair the strength of the treated material. A mixture of the two products (2·25:1) is stated to obviate these disadvantages provided the curing step is carried out so as to fix the resin properly, i.e. increased temperature, longer time, and greater amounts of catalyst. Attention is also drawn to the necessity of neutralising any residual alkali which may be present in the mercerised cotton fabrics before treatment.

USP 2,804,402 of Monsanto states that, in general, dimethylol ethylene urea gives rather high losses of tensile and ripping strength on cotton, but the resistance to chlorine-retention-damage is better than with melamine-formaldehyde or urea-formaldehyde. Good results may be obtained by suitable mixtures of dimethylol ethylene urea and methylated methylol melamine within the range of 4:1 to 2:1.

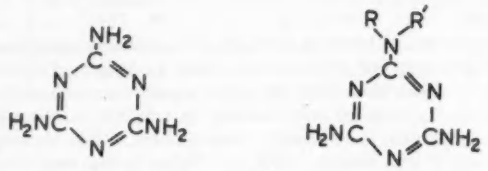
In an actual example, 8 parts of a 50% solution of DMEU was mixed with 5 parts of an 80% solution of MMM and applied in the usual manner with 2-amino-2-methyl-propanol hydrochloride as catalyst. When the conventional test for chlorine-retention-damage was applied the tensile loss was only 6%, compared with 16% with DMEU alone, and 67% with MMM alone.

It is well known that melamine-formaldehyde is more basic than urea-formaldehyde, but there was a lack of precise information with regard to dimethylol ethylene urea. However, from data supplied by Nuessle (Am. Dyes. Rep., 1958, **47**, 465) there appears to be little difference between DMU and DMEU in this respect, so that the superiority of the latter with regard to chlorine-retention-damage is undoubtedly due to the relative absence on imino-groups susceptible to chlorine.

As might be expected, the buffering power of the various methylol-melamines depends on the number of methylol groups, i.e. upon the degree of substitution, but the actual buffering power of the fully condensed resin in the crease-resisting fabric may be different from that of the original pre-condensate.

Melamine, or triamino-triazine, possesses three amino-groups, only two of which are actually required for the formation of the necessary methylol derivative, so that the third may be used for other purposes; for example, a long fatty chain may be attached in the free position to impart water-repellency as with Phobotex and Permel. It is also possible to utilise the third amino-group to make a derivative of melamine which is still more basic than melamine itself. USP 2,833,674 refers to disubstituted products, such as N.N′ dimethyl melamine.

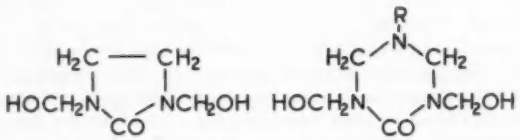
Products such as N.N′ dimethyl dimethylol melamine are very good indeed in respect of resistance to chlorine-retention-damage but they are expensive. However, as little as 5 mole % in conjunction with DMEU gives excellent results; an accelerated chlorine-retention-damage test gave



a loss in strength of only 12 to 16% with the mixture, compared with up to 90% from DMEU alone.

The object of these mixtures is to include a product with a very low capacity for chlorine, together with a more basic product with a high buffering power for the small amount of hydrochloric acid which may be produced. Later developments show that it is possible to combine these two features in one chemical compound.

The triazones, or dimethylol N-alkyl perhydro-triazones, have been known since about 1942-44 but did not become generally available in the U.S.A. for commercial use until about 1954-56; the relation to dimethylol ethylene urea may be seen from the formulae.



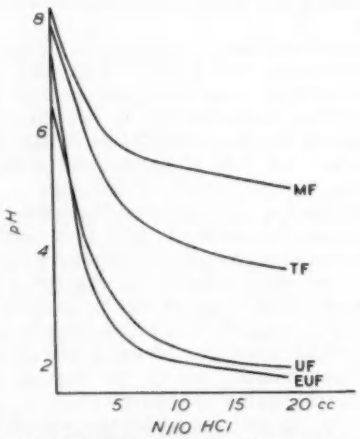


Fig. 4. Buffering action of various amino-aldehydes, according to Nuessle

In both structures the nitrogen is completely blocked so that any chlorine absorbed will be very small and due to impurities or free imino-groups produced in the final condensation. With the triazone, the buffering power is high and the chlorine-retention-damage is low.

The differences in buffering power of dimethylol melamine, dimethylol triazone, and dimethylol ethylene urea have been shown by Nuessle (supra); the triazones show no tendency to yellowness on chlorination, but there is some discolouration on ironing. They also produce a fishy odour unless the treated goods are given a very thorough wash after the final condensation.

Nuessle has compared the effect of chlorine on goods treated with dimethylol ethylene urea, and with dimethylol triazone, as shown in Table 6.

The difference between the effect of the two products is clearly seen in that there is very considerable damage from DMEU with only 0·10% of chlorine, whereas 0·26% of chlorine produces very little damage with DMT because the hydrochloric acid formed on heating is firmly held by the more basic compound.

Table 6. Chlorine Damage with Ethylene Urea or Triazone

Treatment	Wash	Chlorine Retention %	Chlorine Damage %
Untreated	none	0·01	0
	pH 9·6	0·01	0
	pH 11·2	0·03	0
DMEU	none	0·04	3
	pH 9·6	0·05	8
	pH 11·2	0·10	69
DMT	none	0·13	9
	pH 9·6	0·18	11
	pH 11·2	0·26	7

It will be seen that the triazones, because of their structure, actually absorb more chlorine than DMEU, but as they are more basic, there is less chlorine-retention-damage. Triazones, however, possess certain minor disadvantages such as heat discolouration, poor resistance to hydrolysis and only moderate crease-recovery.

In view of the fact that chlorine-retention-damage may be reduced to a minimum by employing formulations which only permit the absorption of small amounts of chlorine and its firm retention in the crease-resisting goods when hydrochloric acid is formed on heating, attention has again been directed to the versatile melamine. Unlike urea, it is possible to treat melamine with formaldehyde to make a fully-substituted methylol derivative in which the chlorine absorption is very low indeed; such compounds are not very stable and tend to lose methylol groups so that the chlorine absorption may increase after several washes. However, when the methylol melamine is methylated the product is much more stable, the tendency to chlorine absorption is reduced and although there is a decrease in the basic properties of the condensate, this is already adequate, for melamine-formaldehyde is much more basic than dimethylol triazone. By suitable means, it has been possible to make condensates of the DMEU and the triazone compound in which the chlorine absorption is very low, the crease-recovery is high and the durability good. The basic character of the pre-condensate is suppressed by the etherification technique and it is not until the treated product is subjected to hot ironing, that a sufficient number of basic groups is liberated to buffer the small amount of hydrochloric acid formed. It is believed that most of these preparations are based on combinations of DMEU and a highly-methylated, highly-methylolated melamine. As the chlorine absorption is very low, the extent of yellowing is remarkably small and may be completely absent.

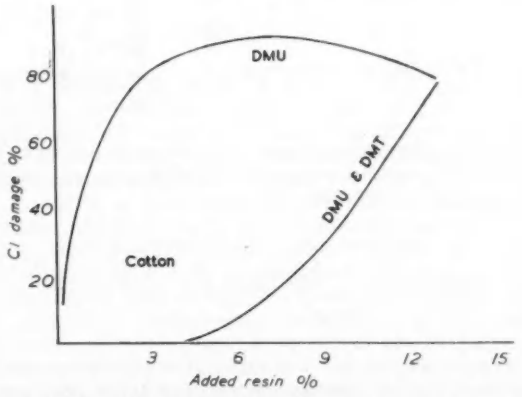


Fig. 5. Effect of adding DMT to DMU to a constant resin concentration of 15%, according to Wayland.

Acid Agers

Acid ageing is used primarily to bring about the coupling of the components of stabilised azoic dyes. Successful and economical operation of acid agers depends on two things : proper materials of construction and good control of time, temperature, and acid content of the steam

By L. H. FERGUSON

FOR acid ageing, the equipment needed is somewhat similar to that used for neutral steam ageing. The acid ager is used to develop the stabilised azoic colours such as the Rapidogens, which replaced the old rapid-fast colours. The latter were aged in neutral steam. The ager itself resembles the vat ager, with top and bottom rollers set up in much the same way. Some acid agers have double sets of rollers, which increase ager capacity by 75% without adding floor space. Usually, the top rollers are driven. The bearings for all rollers are set out from the ager 8 to 12 in. to protect them as much as possible from the corrosive vapours of acetic or formic acid.

The openings in the side of the ager through which the roller shafts pass are well sealed with acid-resistant packings. Outside the housing, sling rings catch condensate and throw it off before it can reach the bearing. The ager is well insulated to conserve heat and reduce condensation. All inside areas are made of 316-type stainless steel. The roof is heated by black-iron steam pipes to which stainless steel sheet is welded to get heat transfer. Ceramic materials like glazed tile can be used for ager walls, but because they break easily they have not become popular.

The acid ager has a heated throat similar to that in a neutral-steam ager. Only one stack is used on an acid ager and it is at the entering end. There is no point in exhausting steam and acid at the delivery end of an acid ager. The front stack is used only to take away acid fumes that would otherwise be quite obnoxious. Acetic acid or formic acid is introduced to the ager in several ways. It may be vaporized by dripping the acid on to a steam-heated plate at the bottom of the ager. Or it may be run into a trough where it is vaporized by a steam coil. In some acid agers, the acid is fed into the low pressure steam line. In most agers a steam injector is used to feed the acid-steam mixture to the ager.

Corrosion

The first acid ageing was done in conventional cast-iron agers by pouring acetic acid in the water well, but the acidic conditions caused serious maintenance problems almost immediately. So wooden-walled agers were built for acid ageing. Brass rollers were used to carry the goods. These rollers became coated with copper acetate, which inhibited further corrosion. Maintenance on these agers was high and they had to be rebuilt about once a year. Modern acid agers built of stainless steel give little trouble. Superheated steam is generally used to avoid excess moisture which causes poor fixation and lowers crock resistance. What moisture is needed is introduced by putting weak (20%) acetic acid through the steam injector.

How the Ager Works

The dyes that require acid ageing belong to the naphthol family, are the stabilised azoic dyes. A one-package product includes the naphthol, the base, and a stabiliser that prevents coupling of the naphthol and the base prior to ageing. For short runs, dry azoic colours are used. They are dissolved with the aid of urea, cellosolve, or methyl alcohol, and the necessary amount of caustic soda.

If the azoic dyes are used much, they are generally bought as stabilised solutions that require only a small amount of caustic to be ready for use. When these colours are exposed to the acid fumes in the ager, the caustic is neutralised by the acid and the hot steam causes the naphthol and base to couple and form the colour. Slow ageing with weak acid (about 20%) produces better wash-fastness and there is less tendency to stain white grounds.

Fast coupling with stronger acid tends to give surface effects instead of the desired well-penetrated coupling produced by longer exposure to weaker acid. Acid agers are sometimes fed a mixture of acetic and formic acids on the recommendation of dye manufacturers. But tests in one plant showed that goods aged with acetic acid alone give less staining of soaper liquor after ageing than goods aged with mixed acid.

Condensate

The acidic condensate from an acid ager may contain 5 to 10% of acid. In some plants this is collected, checked for acidity, and brought back to full strength with glacial acetic acid. Plants that do a wide variety of work have found it profitable to build vat acidagers that can be used with neutral steam for vat colours or supplied with acid to handle the azoic dyes.

These units are made of 316-type stainless steel when necessary to avoid corrosion. Steam is generated in a water well. A trough equipped with a steam coil is used to vaporize the acid when azoic dyes are to be aged. Festoon agers are also used for acid ageing as well as vat ageing. The flash ager idea has also been applied to acid ageing. Early models were designed primarily to help the printer check his work for snaps, streaks, or misfits before too much yardage had been printed. These agers held about 10 yds. of goods and were run in tandem with the printing machine. Ageing had to be completed in a large acid ager.

The next development was to add a scray or J-box made of steam-heated pipes to hold 70 to 125 yds. of goods according to weight. Some agers are built with more than one scray so that a long dwell period can be obtained at higher print-machine speeds. These agers work well if azoic-colour content of the print is not too high. But in plaids or in other patterns with large coverage by azoic dyes, there is danger of uneven ageing and of marking off.

A good balance must be maintained between input and output to get enough dwell time without overloading the scray. Packed goods and over-moist steam often lead to mark-off trouble. Flash agers that have rollers similar to vat agers are also in operation. While they require more space than those with scrays, they do not require such close attention.

Newer Azoics

The newer stabilised azoic dyes marketed as Neutrozoic, Rapid Age, and Fast Fixing work well in the acid flash agers because they will age completely in 30 to 60 secs. Fastness to washing and crocking is generally superior to the older types of stabilised azoics, particularly in red shades. The size of the ager is governed by anticipated printing speeds. If the machine is to be run at 100 yds./min., the ager should be large enough to hold at least 100 yds. of goods.

Course on Statistical Quality Control

The College of Advanced Technology, Birmingham, offers a three weeks full-time course on "Statistical Quality Control and Acceptance Sampling" commencing on September 11, 1961. Primarily intended as an introduction to the subject, it provides the basic training necessary for quality control engineers. The first fortnight will be spent in covering general principles and procedures. The final week will be devoted to lectures by specialists from industry and to visiting works. Application forms can be obtained from the Bursar, College of Advanced Technology, Gosta Green, Birmingham 4.

* * *

Textile Institute Activities

This year's Convocation will be held in the Lesser Free Trade Hall, Manchester, on November 3, the 1961 Conversazione will be held at Leeds University on Friday, December 10. A comprehensive programme is being planned, including demonstrations and exhibitions, film show, buffet, dancing and entertainment.

---

* *Courtesy of U.S. Industrial Digest.*

† *Printing Superintendent, Wade Manufacturing Co., Wadesboro., N.C., U.S.A.*

False-Twist Crimping Processes*

Points dealt with in this paper include the methods of false twisting, the various types of heaters, the importance of tension control, the two general methods of producing modified false twist yarns, yarn properties and end-uses

By R. E. FERRANS†

FALSE twist yarn consists of a bundle of twist lively filaments which are not tightly bound together by twist and the main distinguishing properties—bulk and stretch—are due to this. If the yarn is allowed to relax, small snarls form in the filaments causing the typical bulky appearance and in pulling out these snarls the yarn can be stretched by as much as 300%. The processes involved in the manufacture of twist crimped yarns are the same whether it is carried out in separate steps as in the conventional crimp process, or in one continuous process as in false twist. The three basic steps are twisting, setting and untwisting.

In the twisted state, the bundle of filaments is held together by twist and each filament is twisted to the same t.p.i. as the bundle. At this stage the filaments are under considerable torsional stress. On setting, the torsional forces decay so the yarn—although still held together by twist—is no longer twist lively. Untwisting removes the twist binding the filaments together and re-introduces the twist liveliness in the filaments. All the filaments are twist lively, but are not held together by twist. They are free to snarl individually causing the yarn to reduce in length and introducing the typical bulky appearance to the yarn.

In the conventional crimp process, the three steps are carried out separately. Including rewinding and uptwisting in two stages, the process involves anything up to ten operations; production is very slow, usually less than ½ lb. per week per spindle for 70 den.

The time consuming processes in this method of production of twist crimped yarns are the twisting processes. The twists involved are of the order of 70 t.p.i. for 70 den. yarn with approximately the same twist factor for other deniers. The introduction of false twisting, therefore, with its high twisting speeds and the single operation in which the three processes of twisting, setting and detwisting are carried out, enables the production rate to be increased from ½ to anything from 2½ lbs. per spindle per week, to 15 lbs. per spindle per week for 70 den.

If we take a length of multifilament yarn, hold the ends and rotate the centre about the yarn axis, the result is equal amounts of twist, of opposite sense, in the two halves of the yarn. The algebraic total of twist is zero; hence the name false twist. But if we consider either half separately, the twist is real. Now rotate the centre continuously and move the yarn along its axis. The twist initially on the downstream side moves away to the wind up. Twist from the upstream side passes through the twisting point and is untwisted. Fresh yarn enters the upstream and is twisted. As much twist is taken out as is put in. Hence the yarn which leaves the supply package with only about ½ t.p.i. is taken up at the wind up with the same twist.

If we now add a heater, a tension control, and a twist snubber, we have a false twist machine in which the three processes of twisting, setting and untwisting are carried out continuously and simultaneously. Because the yarn between the tensioner and the twist head is highly twisted, it will contract in length and so the yarn speed in this area will be less than in the untwisted regions.

Methods of False Twisting

The factor which limited the rate of production for a number of years was the speed with which twist could be inserted into the yarn. In the original patent specification of Finlayson and Happey, a spindle speed of 16,000 r.p.m. was mentioned. That is 16,000 turns of twist could be inserted each minute. Recent speeds quoted vary from 80,000 r.p.m. to 350,000 r.p.m.

At high speeds it is found insufficient to just bring the yarn up to the temperature of setting. The torsional stresses take time to decay so that the yarn must be maintained at the setting temperature for a time which depends on the twist, temperature and the quality requirements. This time is usually about half a second.

Most twist heads consist of a tube with a pin or pulley across a diameter. The varn passes along the tube axis and once around the pin. For every one rotation of the tube one turn of false twist is inserted. The major differences between twist heads are in the methods of supporting and driving the tube. They can be summarised as shown in Table 1.

Table 1

Types of Drive	Bearings
1. Gears	1. Ball Races
2. Belt	2. Air
3. Air Turbine	3. Centreless Grinding Type
4. High Frequency Electric Motor	

Examples of machines using the various combinations of drive and bearing are:

(1) The original patent specification of Finlayson and Happey mentions a twist head using ball races and driven by gears, running at 16,000 r.p.m.

(2) The C.S.3 machine of Scraggs uses ball races and a belt drive and is usually driven up to some 80,000 r.p.m.

(3) A recent paper describes a Czech machine using an air turbine supported on air bearings running at up to 100,000 r.p.m. The inventors claim this principle can be used up to 300,000 r.p.m.

(4) The Barmag machine uses a modified centreless grinding type bearing. Two wheels and a belt are used to support the tube and the belt provides the drive. This machine runs at up to 175,000 r.p.m.

(5) The Heberlein machine uses a high frequency electric motor drive supported on air bearings. The "tube" is the hollow shaft of the motor and the speed is 180,000 r.p.m.

(6) The Leesona 553 uses a belt drive but details of the bearing have not been released. It runs at up to 350,000 r.p.m.

A new principle, that of friction twisting, has recently been developed at B.N.S. Using this principle it is possible to twist the yarn at up to 1,000,000 t.p.i. with machine speeds of only 5,000 r.p.m., although long before this speed is reached, the setting time becomes the limiting factor.

The characteristics of the E.P.1. machine which uses the friction twisting principle were described by D. F. Arthur and A. F. Weller (J.T.I. Feb., 1960). Briefly they are as follows.

(1) Equivalent twisting speeds of up to 1,000,000 r.p.m. without the rotating machine parts exceeding 5,000 r.p.m.

(2) No adjustment is needed for a change of denier since a constant twist factor is automatically produced.

(3) The friction twist head is only one quarter as sensitive to yarn and twist head speed changes as a conventional false twist head.

(4) Low deniers are twisted at a higher rate than heavy deniers for the same machine r.p.m. In other twist heads, the rate of insertion of twist is independent of yarn denier.

* *A paper given recently to Derby Textile Society.*

† *Textile Development Dept., British Nylon Spinners Ltd., Pontypool.*

Types of Heater

Many types of heater are in use. A typical selection would be:

(1) Contact plate (i.e. Scragg C.S.3)
(2) Contact tube (i.e. Scragg C.S.1)
(3) Steam (i.e. Celanese original machine).
(4) Air (i.e. the E.P.1 machine).

The two zone air heater as used on the E.P.1 machine is intended to heat the yarn very quickly and then hold it at the setting temperature for a time dependent on the yarn speed and the heater length.

As machine speeds have increased it has been found necessary to increase the length of the heater in order to keep setting times more or less constant.

Machine	Speed	Heater Length	Speed Heater Length
C.S.1	40,000	9 in.	4,444
C.S.3	80,000	12 in.	6,666
Barmag	175,000	25½ in.	6,863

The length of the Barmag heater has been reported by various authors to be anything from 10 to 40 in. Measurements on published photographs show the heater to be about 25½ in. long.

For the E.P.1 machine it has been found necessary to resort to two zone heating in order to keep the heater down to a reasonable length. For a yarn passing over a heater, the rate of heating depends on the difference between yarn temperature and heater temperature. The shape of the curve of yarn temperature against distance along the heater is shown in Fig. 1.

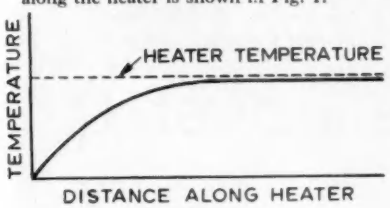


Fig. 1.

In the two zone heater, the first zone is set about twice the yarn setting temperature so that the heating rate is much greater. The first zone is of such a length, however, that the yarn leaves the hot zone just before it reaches its melting point and enters the second zone which is maintained at the setting temperature. The temperature—distance curve is given in Fig. 2. In this way the yarn is quickly brought up to the setting temperature and maintained at that temperature for the required time.

Control of Tension

Tension control is necessary partly because if the tension is too low, the yarn may snarl in the twisted portion of the threadline and partly because variations in tension may cause variations in quality of the bulked yarn. Tension control may be achieved by the use of a positive feed system or by the use of tensioners.

To avoid snarling of the yarn as it leaves the package it is necessary to prevent twist running back beyond the tension control point. The tension control therefore must be both a tensioner and a twist snubber. The choice of feed roll systems or tensioners is usually restricted by this need for twist snubbing. It is usual to use as low a tension as possible whilst still keeping adequate control of the threadline although it may be necessary to adjust tension to obtain special effects.

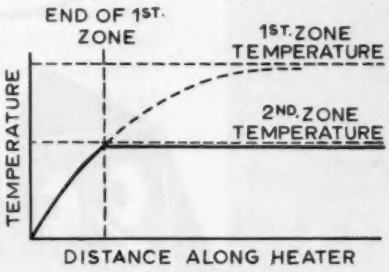


Fig. 2.

Modified False Twist Yarns

There are two general methods of producing modified false twist yarns.

(1) To modify the processing conditions to produce special effects. This has been investigated fairly comprehensively by Burnip and Hearle (Man-Made Tex. Sept., 1960 to Feb., 1961).
(2) To treat the false twist yarn by setting it under a controlled tension or overfeed thereby reducing the stretch characteristics whilst retaining the required amount of bulk. This is the basis of the S.A.A.B.A. process.

Yarn Properties

The characteristic properties of bulk and stretch are both due to the small snarls that form in the individual filaments of the relaxed yarn. The stretch, due to pulling out of the snarls, may be up to about 300% of the relaxed yarn length. The diameter of the yarn depends, amongst other things, on the residual twist and the degree of relaxation of the yarn. Whilst the actual moisture regain properties of the yarn are unaffected by bulking, the surface moisture retention can be higher, resulting in a greater feeling of comfort in wear. The thermal properties of the fabrics are influenced by the presence of air pockets in bulked yarn. The fabric density is reduced and the fabric appears warmer and softer than the equivalent fabric made from flat yarn.

End-Uses of False Twist Yarn

A large outlet for false twist yarn has been found in the half hose market. Its use is also increasing in such things as hose, swimwear, knitted outerwear and underwear. Because bulk and stretch are so intimately connected, the fabric has to be knitted loosely and then bulked to develop the softness and bulkiness of the yarn. Consequently, some stretch in inevitable in the finished fabric. This has tended to limit the use of false twist in woven fabrics although its use is increasing especially where some degree of elasticity is required in the finished fabric.

New Auxiliary for Cotton Goods

LYOFIX NC, a new heterocyclic reactive resin recently introduced by Ciba Clayton Ltd., Manchester 11, and specially developed for cotton, is claimed to confer the following properties on the finished goods:—

(1) Good wash-and-wear effects, i.e. dimensional stability, minimum creasing on washing, easy to iron.
(2) Good fastness to repeated washing.
(3) Very good resistance to repeated chlorine washes and subsequent ironing without need for an antichlor.
(4) No yellowing of the goods during finishing or on washing with chlorine-containing washing products and subsequent hot pressing.

It is a water-clear, stable liquid which can be freely diluted with cold water and can be combined with most textile auxiliary products. For a good wash-and-wear finish on poplin, bleached but not optically brightened, and mercerised, Ciba recommend the following standard recipe:—

120 - 160 g/l	Lyofix NC
	add acetic acid to pH 6
20 - 30 g/l	Migafar L
1 - 3 g/l	Uvitex CF conc.
15 - 20 g/l	magnesium chloride hexahydrate

The non-ionic softener, Migafar L, can be applied in combination with Uvitex CF Conc. Although the fluorescent brightener can be added after catalysing with magnesium chloride, the addition of the brightener in the well-diluted uncatalysed bath is recommended.

Migafar L gives the finish a smooth not too limp handle, increases the crease angle, the sewability as well as the abrasion resistance and is fixed fast to washing by the resin finish. It is normally used in concentrations of 10 - 30 g/l.

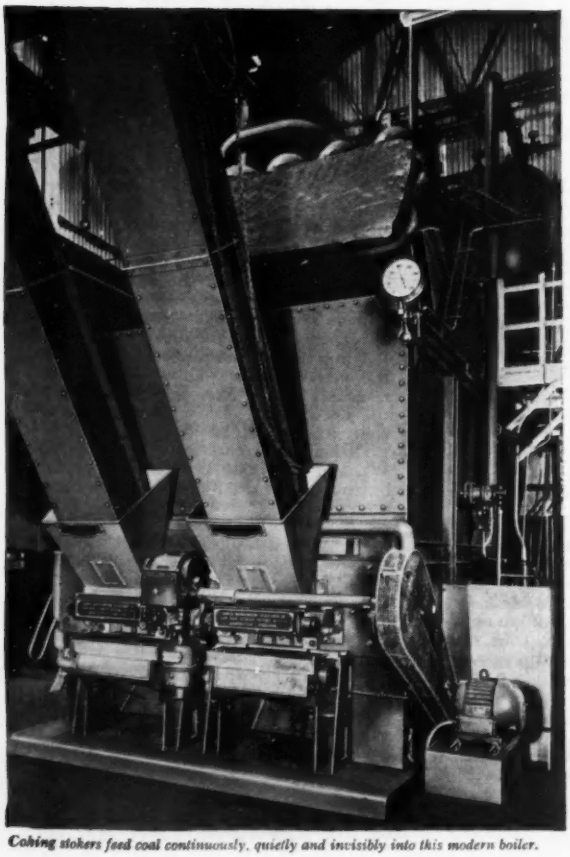
Cationic softeners such as Sapamine WL and Sapamine WP can also be used but not in combination with anion-active products. The ion activity of the various components of the resin finish must always be considered and preliminary tests are advised in doubtful cases.

For a Schreiner finish on cotton, the following recipe can be used:—

70 - 90 g/l	Lyofix NC
pH	adjusted to 6 with acetic acid
10 - 20 g/l	Sapamine WP or WL
0 - 10 g/l	Vibatex ES
10 - 12 g/l	magnesium chloride hexahydrate

This recipe can also be used for embossing and chintz effects generally.

COAL–properly used– is the cheapest fuel for the Textile industry



Coking stokers feed coal continuously, quietly and invisibly into this modern boiler.

The very range and complexity of the Textile Industry makes it extremely sensitive to the fluctuations in the industrial barometer as the fickle demands of fashion make one fabric popular at the expense of another. Thus, no part of this great industry can afford to ignore any possible economy, any possible improvement that will keep prices competitive while satisfying—and expanding—markets both at home and overseas.

BEGIN AT THE BEGINNING– THE BOILERHOUSE

There are still some textile firms that handicap their finances with outdated boilerhouses. To modernise other machinery while 'making-do' with inefficient boilers is to throw good money down the drain. Coal-burning installations, mechanically stoked, can be so efficient that they will more than pay for themselves in a remarkably short time. They are, without question, the first essential in a factory that is going to make rising profits for its management.

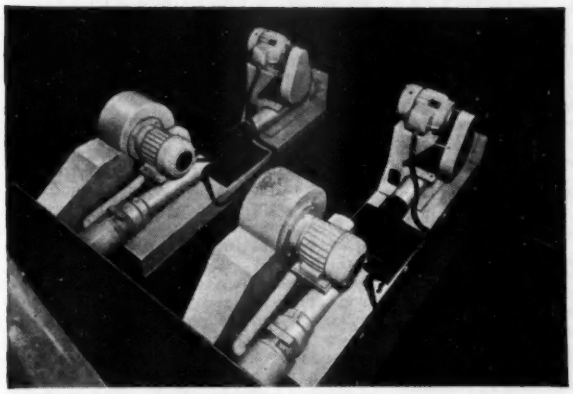
COAL IS THE RELIABLE FUEL

One question for any long-term planning is obvious: can supplies of coal be guaranteed? The answer is yes—without qualification. The mining industry—Britain's largest single industry is becoming increasingly efficient; its equipment is the best of its kind. And British coalfields contain enough coal to supply every industrial demand for centuries to come.

COAL IS CLEANER, HOTTER

Modern grading and washing methods ensure that coal is the most efficient and consistent fuel for every type of boiler—the ideal fuel for every section of the textile industry. But to obtain the maximum heat at the lowest cost, coal should be mechanically stoked. A mechanical stoker automatically feeds the right amount of coal for the boiler load even when the load is varying; it burns coal at optimum efficiency all the time without the emission of smoke (thus complying with the regulations in Smoke Control Areas) and it virtually replaces the human element in boiler operation.

There are many types of mechanical stokers, of which the most commonly used are the Chain grate stoker, the Coking stoker, the Underfeed stoker and the Sprinkler stoker. Standard models are available for all sizes of boiler.



Two underfeed stokers which will feed coal direct from a storage hopper into a modern vertical boiler.

OVER 80% OF BRITISH INDUSTRY USES COAL

The National Coal Board is determined that COAL shall continue to be plentiful, shall continue to keep our industrial power both dominant and progressive. You can depend upon COAL: its sources and supply are in our *own* hands—free from the fluctuations of foreign policies. Endless research by scientists and chemists working in the laboratories of the N.C.B. will ensure that coal will be increasingly profitable for its users.

DELIVERY—ON THE DOT —ON THE SPOT

The delivery of Industrial coal is today organised and completely reliable. Leading coal merchants have completely overhauled delivery and storage systems and are fully equipped to make sure that you get the right grade of coal when you want it and where you want it.

Furthermore, a completely mechanised handling system will transport coal from bunker to furnace without any manual labour at all.

FINANCE PLAN FOR INDUSTRY

No deposit, repayments spread over five years, and low interest charges that can be set against tax, full investment and other capital allowances that can be claimed at once—these are the terms available to the manufacturer or businessman who wants to install modern coal-burning equipment without touching his capital resources.

Make use of the National Coal Board Industrial Finance Plan. The loans are made by Forward Trust Limited, a member of the Midland Bank Group. A 'phone call or a letter to the regional office of the National Coal Board will bring you full details.

AND—WHEN YOU NEED IT—A NATION-WIDE FREE SERVICE

The vast resources of the National Coal Board are no further away than your telephone. At a flick of your finger, you can call upon one of the most comprehensive and efficient technical services in the world. No problem is too small or too big. You may want advice on coal quality, coal storage, coal-burning appliances or even on the siting of a boilerhouse. Whatever it is, a 'phone call or letter either to your coal supplier or to the regional office of the National Coal Board will bring an unbiased and authoritative answer to your problem.

SOLID FUEL—more heat at less cost—and it's British

PROGRESSIVE INDUSTRY IS GOING FORWARD ON COAL

ISSUED BY THE NATIONAL COAL BOARD

Developments in Frame Spinning Techniques*

In addition to discussing recent innovations and mechanical improvements this paper also dealt with other important factors which had to be considered in any comparison between mules and ring frames

BEGINNING with a brief review of the two methods used in spinning woollen yarns, Mr. Thorndike said that on the mule, drafting and winding-on were carried out in the same zone though naturally with the carriage moving in the opposite sense. Twisting was done partly during delivery and drafting whilst the carriage was moving, but for yarns with more than say 3 or 4 t.p.i., mainly "at the head". Mule spinning was a cyclic, intermittent process. Frame spinning was continuous, drafting being separated spatially from twisting and winding. There was a drafting zone between the back and front rollers and a spinning (or twisting and winding) zone below the front rollers incorporating the ring, traveller and yarn package. To get the most even yarn it was necessary to draft against twist usually inserted by a *false* twist device. This inserted twist into the material as it left the back rollers—but no twist was retained between the device and the front rollers.

The exact nature of the false twist device varied from one make of frame to another. Thus, spring jaws, centrifugal jaws, a finger sticking out from the inside of the false twist tube at its bottom, or needles projecting from its base inclined inwards to catch on the material had all been used. In all these cases it was vital to get the "jaws" as close as possible to the nip of the front rollers since this region was twistless under running conditions.

To avoid having even a very short untwisted length of material between the lower end of the false twist device and the front rollers, the front rollers had been incorporated into the false-twist device by one German manufacturer and also at Leeds University.

The twistless material from the front rollers usually passed through a pot-eye or pig tail in line with the axis of the spindle, the top of which was a few inches below the pot-eye and this axis was usually a few inches forward of the vertical through the front roller nip. One object of displacing the centre line of the spindle and pot-eye in this way was to make it possible to remove and replace tubes on to spindles, the pot-eyes being hinged so that they could be swung out of the way.

The remaining important part of the frame, continued Mr. Thorndike, was the ring on which rode the traveller. Material from the pot-eye passed through this traveller prior to being wound on to the package so that the traveller was pulled round the ring as the package rotated. This inserted twist and simultaneously wound the yarn on to the package. To make a well built package the ring-rail had to be given motion with respect to the spindle. It was easier to move the ring-rail since drives had to be provided to cause the spindles to rotate but, if all the motion was restricted to the ring-rail, then the distance from the pot-eye to the ring-rail would vary appreciably during build of the package. The yarn in this region normally formed a balloon and, if the height of this balloon varied, the tension in the yarn also varied.

If very large packages were required the height of the package had to be big (up to 16 in. or so) and the variation in balloon length could then be so great from empty to full package that a stable balloon would not be obtained unless steps were taken to ensure this. It became apparent that the balloon should be constrained by one or more balloon control rings—at any rate—when dealing with coarse counts. One would expect a reduction in the tension of the material being spun to cause the balloon to increase in diameter so obviously there was a minium yarn tension as well as a maximum for acceptable spinning conditions on the frame.

Pointing out that recent frames often had a treble front roller system instead of the original double roller to give a much better grip on the material, Mr. Thorndike said this minimised the possibility of the material slipping, i.e. being held back by the large drafting forces developed with longer fibres in the drafting zone, when spinning coarse counts. To improve the grip still further it was usual to find the single roller—which was pressed against the other two—covered with some resilient material.

A felt or plush covered scavenger roller used to be mounted immediately below the front rollers to trap broken ends and try to prevent them lashing into neighbouring ends causing doubled yarn. Scavenger rollers were always difficult to clear and the small amounts of waste removed from them tended to be dirty and it was often thrown away. It was now common to fit pneumatic suction nozzles instead so that *soft*, clean waste could be sucked away to a suitable container for re-use in other blends. This device had its problems, however. A broken end was not so noticeable and might not be piecened as quickly as it had to be with a scavenger roller.

Collapsed Balloon Spinning

The latest design of frames often included a "gadget" fitted to the spindles to produce captive or collapsed balloons. Around 1930 the frame at Torridon had spikes, some 5 in. long, sticking vertically upwards from the top of the spindles, the pot-eyes being removed. The effect of this was to cause the material to be wrapped on the spike part of the spindle blade and to wind round this for a few turns before leaving to go through the traveller.

On a recent frame, the spindles had been extended upwards like pillars with a wire case trapping device fitted on top of the pillars but, in this case, the pot-eyes were still used and it was most important to have them central with the spindle and only a short distance above the wire cages. In this example the balloon was now collapsed, wrapping not only round the pillar but also around most of the package too when spinning began.

Another firm had added small ball-bearing-mounted flyers to the tops of their spindles so that the material, after passing through a central hole in the middle of the flyer stem, wound around the outside of the stem—which is about ½ in. dia. before passing through the flyer and thence to the traveller. The flyer device in particular might also help to feed twist back to the front rollers. There was no pot-eye with either this or the old W.I.R.A. spike to act as a twist barrier. When the yarn wrapped around something which was rotating at spindle speed this might introduce a capstan effect. The material might slip round the rotating surface from which it was pulled by the traveller. This could reduce the tension in the material above the top of the device and hence in the untwisted material just issuing from the front roller nip.

Speed and Power

Power consumption might be reduced to some extent by collapsing the balloon since there would be less air drag to absorb energy. However, the air drag on the package and the frictional force of the traveller on the ring had still to be overcome and these could be considerable for high speed spinning. The 10 - 12 h.p. motor usually adequate for older frames had often to be replaced by one 50 h.p. (or two 25's) when using a smaller number of spindles with large diameter rings.

It used to be thought that a speed of about 90 ft./sec. was the maximum for a traveller if burning and undue wear of the ring was to be avoided. It has been stated, however, that provided lubricated rings were used, speeds of up to 100 ft./sec. were just about possible with steel rings

---

* *From a recent lecture to Batley and District Society given jointly by Mr. J. G. Miller and Mr. G. H. Thorndike (Wool Industries Research Association).*

and travellers without too great a danger of such damage occuring—if rings were properly run-in. For speeds in excess of this—which were being achieved in some mills—it was necessary to use nylon travellers which did not wear the ring so much. Unfortunately, nylon travellers could be badly worn by some wool fibres with the result that they had to be discarded after only three or four days use. (This did not seem to apply with other fibres).

Another topic mentioned by Mr. Thorndike was the possibility of using variable speed motors to try to obtain more uniform yarn tension during the build of the package. He also drew attention to a big difference between mule and frame spinning. In the former the yarn was only in contact with the delivery rollers and the spindle tip during the whole of its formative period and only two other metal surfaces, the two faller wires during winding of the package. The only tension to which it was subjected was that necessarily applied during drafting to stretch the material and that applied by the tensioning faller to ensure a firm package during winding. The yarn was not responsible for driving or supplying energy to anything in the mule except changing the position of the tensioning faller during winding. On the other hand on the frame, the material was in contact with many more surfaces—back rollers, brake rail, top of false twister tube, jaws of false twister tube, front rollers, pot-eye, traveller and (for coarse yarns) balloon control ring or separators or gadget for collapsed or captive balloon spinning. The yarn also supplied energy to cause the traveller to rotate.

Because the frame was a high productivity machine it was much more serious to have a large number of ends down than in mule spinning. It followed, therefore, that the carding must be good and the blend not too bad for the particular count of yarn to be spun if the frame was to be a commercial proposition. Another possible disadvantage of the frame was that the yarns were not so easily visible as on the mule; ends down were not so obvious and greater waste could arise from this source and it was particularly noticeable when spinning drab shades. It had often been stated that piecening of broken ends could be a further source of trouble on a frame.

The lecturer finally dealt with operative supervision and training, mechanical maintenance, floor space requirements, matching spinning production to that of the card and mechanical adjustment of the spinning machine to give the desired count and twist of yarn. Some test results were also given to indicate that mule and frame spun yarns of comparable count and twist were often similar in strength and levelness. After this Mr. Miller gave details for operative production rates, package sizes and other factors which should be taken into account when comparing mules and ringframes.

Optimum Roving Twist for Spinning 3 den. 3-5 in. Nylon on Worsted Spinning Frames*

THE value "twist factor" enables one to insert the same relative twist into rovings of different linear weights. For a given twist factor, the actual twist (turns/inch) inserted will increase with decreasing roving thickness.†

Experiments in British Nylon Spinners' textile laboratories have been directed to finding the practical limits of roving twist: the lower limit being the stage at which the rovings draft when winding on roving bobbins, and the upper limit being when the rovings are too tightly twisted to draft correctly in the spinning frame.

A reducer frame was set up to produce a 4½ dram/40 yd. roving from a 17 dram/40 yd. finisher slubbing. The roving twist factor was progressively reduced from 2·9 (1·4 t.p.i.) until the rovings ceased to wind satisfactorily on the bobbins. The lower limit was a twist factor of 2·1.

A further series of rovings was made with progressively increasing twist factors. These were spun on a ring frame (roller drafting) and the drafting performance observed. The upper limit was a twist factor of 4·6. Above this figure the rovings tended to "gallop through" undrafted in the spinning frame.

These limits having been determined, three different series of rovings were made with linear weights of 3½, 4½ and 5½ drams/40 yd. In each series the twist factors were 2·1, 2·5, 2·9, 3·3, 3·7, 4·2, and 4·6. These were spun to 32 w.c./11Z on a "Magnum" ring frame, using drafts of 6·1, 7·8 and 9·6 for the 3½, 4½ and 5½ dram rovings respectively. Three-inch rings and 26s travellers with a spindle speed of 4,900 r.p.m. were used. The ratch was 6½ in.

* *From an advance report issued by British Nylon Spinners Ltd.*

† *Twist factor* $= \frac{turns/inch \text{ (actual)}}{\sqrt{+roving\ weight \text{ (drams/40 yd.)}}}$.

Table 1. Conditions Used to Produce Each Roving

To produce	Can gillbox (inter-sector)	Spindle gillbox (inter-sector)	1st draw box	2nd draw box	Dandy finisher	Dandy reducer
3½ dram roving —						
Doublings	6	4	4	2	2	2
Draft	5·9	5·9	6·5	6·7	7·4	7·7
Weight of end produced (drams/40 yd.)	280	190	110	50	13·5	3·5
4½ dram roving —						
Doublings	6	4	4	4	2	2
Draft	5·9	5·9	6·5	6·9	7·5	7·6
Weight of end produced (drams/40 yd.)	280	190	110	64	17	4·5
5½ dram roving —						
Doublings	6	4	5	4	2	2
Draft	5·9	5·9	6·7	7·0	7·6	7·7
Weight of end produced (drams/40 yd.)	280	190	140	80	21	5·5
Ratches used throughout (inches)	2½*	2*	7½	7½	7	7

* **Gillbox ratches: The figures represent the front ratches, i.e. the distance between the nip of the front rollers and the foremost fallers.**

Table 2. Results of Yarn Irregularity Tests

Roving weight	Yarn irregularity (mean deviation %)	Roving twist factor 2·1	2·5	2·9	3·3	3·7	4·2	4·6
3½ drams/40 yd. (spinning draft 6·1)	at 5 ft./min.	6·4	6·3	6·4	6·2	7·3	6·7	6·7
	at 50 ft./min.	11·2	10·8	11·3	11·4	11·9	11·8	12·3
4½ drams/40 yd. (spinning draft 7·8)	at 5 ft./min.	6·2	6·4	6·6	6·3	7·0	7·3	7·9
	at 50 ft./min.	11·0	11·1	11·4	11·3	12·3	12·2	12·1
5½ drams/40 yd. (spinning draft 9·6)	at 5 ft./min.	6·5	6·7	6·1	7·0	7·2	7·4	7·4
	at 50 ft./min.	10·5	11·0	11·3	11·8	11·8	12·6	13·0

Thus the effects of different twist factors on spinning performance and subsequent yarn quality could be evaluated for three different roving weights and hence three different spinning drafts.

Table 1 gives details of the drawing conditions used for the production of each series of rovings and Table 2 gives the results of irregularity tests on each yarn The tests were done on a Fielden-Walker instrument, and the results expressed in terms of the mean deviation (%).

With the yarns spun from the 3½ and 4½ dram rovings the irregularity increased with roving twist factors above 3·3. With the yarns spun from 5½ dram roving a similar increase in irregularity occurred with roving twist factors above 2·9. None of these increases was statistically significant. Although some yarns appeared slightly better than others when wrapped on blackboards, there was no distinct trend of appearance with roving twist.

More significant for the practical spinner was the fact that spinning performance deteriorated when using rovings of all three linear weights with twist factors above 3·3.

Conclusions

When spinning 3 den. 3 - 5 in. high crimp heatset nylon staple:—

(1) Rovings with twist factors in the range 2·1 - 3·3 gave satisfactory spinning performances

(2) Yarn irregularity was not affected by changes of roving twist factor in the range 2·1 - 3·3.

(3) Spinning drafts between 6·1 and 9·6 gave satisfactory performances.

LEADERS IN ALL FIELDS

use HAMWORTHY oil-burners

More and more steam users are installing Hamworthy oil-burners, both Pressure Jet and Rotary, to fire steam raising plant from the largest water tube boilers to small shell boilers.

The Hamworthy Rotary burner is the only burner which will burn with unaltered efficiency regardless of changes in oil pressure and temperature, giving the truly automatic performance needed for complete boilerhouse automation.

If you are considering converting to oil or require new oil-burning equipment you cannot do better than to call in Hamworthy for a consultation at an early stage—they have the experience of oil-burning in your field.

HAMWORTHY

the oil-firing specialists

HAMWORTHY ENGINEERING LIMITED
Poole, Dorset.
Tel: Poole 2020 Grams: 'Burners' Poole

TAS/HY22a

Reviews

ERMITTLUNG DER VORGANGE BEIM BENETZEN UND TROCKNEN VON FADEN UNTER BESONDERER BERUCKSICHTIGUNG DER ARBEITSWEISE VON SCHLICHTMASCHINEN (Investigations into the wetting and drying stages of yarns on sizing machines). By H. Stein and G. Hoischen. Westdeutscher Verlag Köln and Opladen. 1960. 77p. Report No. 917.

The authors studied suitable laboratory techniques to measure the effect of the various stages of sizing on the physical properties of yarn. An increase in gear ratio between trough and beam rack leads to an increase in the stresses in the warp threads. The magnitude of the stress depends on the stress/strain characteristics of the material. Strain on the threads in front of the sizing trough leads to stretch with the effect that greater lengths of yarn are delivered by the rollers than taken from the beam. As a consequence, the strain on the yarns increases in the drying zone.

Rayon and staple fibre show little change in their stress/strain characteristics when stretched dry but cotton is more affected. These initial stresses can be minimized if the warps are drawn off by a roller placed in front of the sizing trough so that the strain of the sizing rollers is constant and small. If drying is carried out in hank form the stress/strain characteristics do not change much. Drying under stretch causes marked changes with subsequent reduction in extensibility.

B.S.

* * *

UNTERSUCHUNG DER VERZUGSVORGANGE AN DEN STRECKWERKEN VERSCHIEDENER SPINNEREIMASCHINEN (Investigation of events during drafting on various spinning machines). Compiled by the Institute for Textile Measurement Techniques, M. Gladbach. Published by Westdeutscher Verlag Köln and Opladen. Report No. 918. 1960 pp. 41

The purpose of this work was to establish a relationship between theoretical and practical considerations concerning yarn irregularities caused by irregular roller motion in the drafting section. As a result of a number of experiments it was possible to calculate, at a known roller knock, the relative width of distortion as a measure of the size of the roller wave. Similarily, from the width of distrotion measured when cylinders and pressure rollers were in circular motion and from the expected values, calculated from certain formulae, it was possible to determine a theoretical width of distortion and so to arrive at a comparison. It could be shown that in the region of large drafts and greater width of the drafting field, theory conforms reasonably well to practice. But accuracy is diminishing with increasing eccentricity of pressure rollers and cylinders. One can say that the values measured in practice exceed those found by theoretical calculation.

B.S.

SIZE AND SHAPE CHANGES OF CONTRACTILE POLYMERS. By A. Wassermann (edited). Pergamon Press Ltd., Headington Hill Hall, Oxford. 1960. pp.118. (price 35*s*.).

This book contains the proceedings of two seminars on Polymeric Science held in 1957 and 1958 at University College, London. The lectures dealt with size and shape changes of contractile polymers and conversion of chemical into mechanical energy. This monograph with five lectures, one of them by Prof. W. T. Astbury on indications on muscles contraction from X-ray diffraction studies for the fibrous proteins, proves the fundamental advance made during the last years on the subject and it will undoubtedly stimulate further research studies.

B.S.

* * *

EINFLUSS VON FETTZUSATZEN AUF DAS RHEOLOGISCHE VERHALTEN VON SCHLICHTEFLOTTEN (Effect of oils and fats on the rheological properties of sizing solutions). By Dr. I. Lambrinou. Westdeutscher Verlag, Köln and Opladen. Report No. 885. 1960. pp.57.

This is the continuation of previous experiments on the influence of various sizing agents and their combinations on warps in the weaving of linen and half-linen fabrics (Report No. 434). The new investigation concerns the effect of fats and oils on the properties of sizes. An extensive series of viscosity measures were carried out on sizes made from native and modified starches, starch derivatives and of CMC-size admixed with potato and maize starch. The influence of the various constituents on each other and on the behaviour of the sizes is illustrated in diagrams and tables. When various oils and fats were added to the sizes it became evident that such additions had a marked influence on the stability of the liquor and also on the viscosity and thixotropy. This was especially true for native or natural starches, either alone or in mixtures.

B.S.

* * *

ZUR BESTIMMUNG DER ABSOLUTDICHTE VON FASERN. (Determination of the absolute density of fibres). By Prof. Dr. J. Juilfs. Westdeutscher Verlag, Köln and Opladen. 1960. Report No. 839. pp.24. (price DM. 8.10).

The specific gravity and density of fibres are essential factors in the consideration of their structural properties. Furthermore, density of fibres is of importance as a relative measure of the strength, of the weight of fabrics, and even as a basis for yarn and fabric construction. Structural differences and irregularities could be identified through minute differences in density.

Two precision methods are suggested for the determination of fibre density. In the first method the density of the float liquid is set by temperature variation; this method gives good values also for the initial stages. The second method is known as the "gradient column" method in which the concentration of the float liquid gradually increases from the bottom of the measuring vessel upwards. This method is easier and permits the determination of density directly from the height of the floating specimen.

Density figures for fibres have a wide application. Values of their absolute density permit to find out the distinction between different types of fibres. Sometimes, it is possible to draw conclusions of their origin from minute differences in density. Scatter values can also be of particular interest. Variations in dyeability often go together with variations in density and with scatter values. Fibre structure as a function of density is also considered.

B.S.

* * *

UNTERSECHUNGEN AN BAUMWOLLKARDEN ZWECKS ERMITTLUNG DER FEHLERURSACHEN FUR DICKESCHWANKUNGEN (Investigations on cotton cards to ascertain variations in thickness). By H. Stein and M. Eidelsburger. Westdeutscher Verlag Köln and Opladen. Report No. 846. 1960. pp.46 (price DM. 14.30).

The subject of this report is the cause of variations in uniformity and yarn count during carding. The instruments employed are described and it is pointed out that deceptive results can be obtained through varying atmospheric conditions within the sliver; these variations may occur in the can in which the sliver is contained. Uniformity of the carded sliver is conditioned by the arrangement of the fibres in the lap. The card has practically no storage facilities and is therefore not in a position to accept excess material and to deliver it at the other end.

Under the circumstances it is a rule that satisfactory working cannot be ensured unless the difference in speed between taker-in and doffer is constant. Transmission faults, especially faulty teeth in gears, may cause irregular running of the taker-in and consequently lead to variations in draft and uniformity of sliver. Periodic variations in uniformity will occur when an eccentric doffer periodically approaches the cylinder thus taking more fibres than at other periods. Variations in thickness can also be caused through displacement of flats. Other undesirable variations in count can occur when accidental accumulation of fibres caused by faulty cards find their way back into the web.

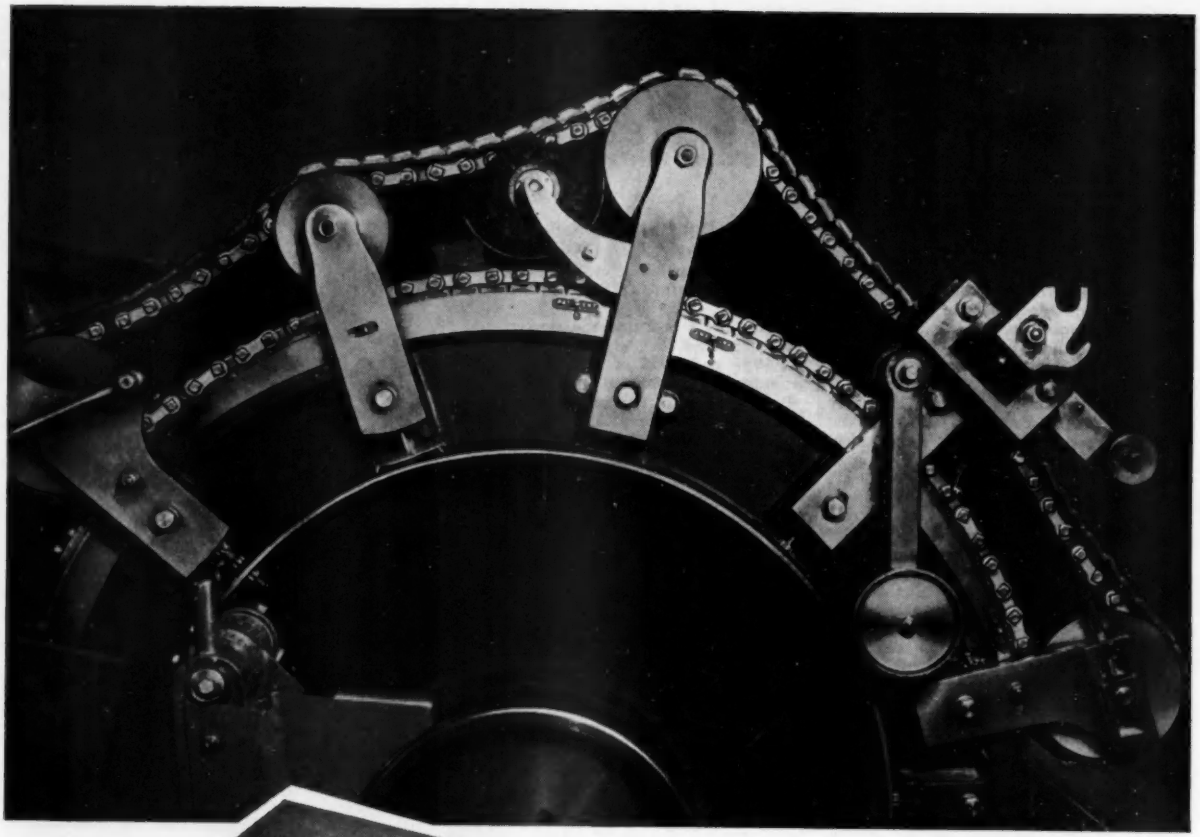
B.S.

* * *

FADENSPANNUNGEN BEIM NASSRINGSPINNEN VON BASTFASERN. (Yarn tension in wet ring spinning bast fibres). By R. Otto and Manfred Le Claire. Westdeutscher Verlag Köln and Opladen. Report No. 920. 1960. pp.54.

In the course of these investigations it was possible to select from a wide range of shapes of travellers those which are most suitable for the purpose, namely "ear" travellers made of composition metal and nylon on HZ-rings, as well as nylon travellers on special flange rings devised by Mackie Ltd., Belfast. The results give, for the first time, a picture of the conditions of tension during wet spinning of bast fibres on ring spinning machines. Of particular importance for the choice of traveller is the fact, realised during the investigations, that a traveller specially designed for wet spinning has great advantages over conventional travellers.

B.S.



Chains are supplied boxed in pairs, for cleanliness of handling and storage. Right and left hand screws are also available.

ANCHOR

FLAT CARD CHAINS available from stock

ANCHOR CARD CHAINS ARE MANUFACTURED FROM HIGH QUALITY STEELS WHICH ENSURE LONG LIFE AND FREEDOM FROM BREAKDOWN. SIZES AND LENGTHS TO SUIT BRITISH, CONTINENTAL AND AMERICAN MACHINES

ALL DESIGNS OF FLAT CARD CHAINS CAN BE SUPPLIED CADMIUM PLATED.

ANCHOR CHAIN COMPANY LIMITED OLDHAM · LANCASHIRE · ENGLAND
(Subsidiary of RENOLD CHAINS LIMITED)
Tel: Main 1447 & 5928 GRAMS "CHAINS" OLDHAM

SKINNER'S HOSIERY AND KNITGOODS' DIRECTORY. Thomas Skinner and Co. (Publishers) Ltd., 44 Brazennose Street, Manchester 2 (price 40*s*.).

The continued expansion of the hosiery and knitgoods industries is reflected in the new issue of this ever-reliable directory, many alterations having been found necessary to ensure up-to-dateness. The excellent arrangement of material enables the reader to find rapidly from the Manufacturers' Section any desired details concerning spinners, manufacturers, dryers and finishers, wholesalers and exporters and the 220 classified headings in the Buyers' Guide to products render it easy to trace from the 15,000 entries suitable sources of supply of specific types of yarns and fabrics.

In addition, 2,500 trade names and their proprietors are listed and a further classified section indicates suppliers of equipment and services.

S.P.S.

* * *

THE YORKSHIRE TEXTILE INDUSTRY. John Worrall Ltd., Oldham (price 30*s*.).

The preface to this 76th annual edition comments briefly on the principal topics currently being discussed in the woollen trade and draws attention to the expansion of the Buyers' Guide section of the directory which now includes clothing trade requirements. Considerable revision has, as usual, been entailed in the directory's preparation and the result is that the user can fully rely on the information given in the alphabetical, classified and topographical lists of Yorkshire firms as well as that provided in the Buyers' Guide and other sections of the directory.

S.P.S.

* * *

DECORATIVE ART 1961/62. Studio Books, 161/166 Fleet Street, London, E.C.4 (price 42*s*.).

It is always a delightful experience to go slowly through this excellent publication. Superbly produced the latest edition has a total of 144 editorial pages, including 16 in full colour and some 450 illustrations in black and white. A new sub-title—Modern Interiors—serves to emphasise the fact that "Decorative Art" focuses on interiors and the elements therein, furniture, glass, ceramics, textiles or tableware. Shirley Conran, one of the best-known designers in the world, comments on design generally and underlines the purpose of this unique volume. Examples from all over the world show the different trends and new ideas in international interior design. The photography, block-making and arrangement could hardly be improved and, although some designs will inevitably invite criticism in certain quarters, the whole work is a remarkable fine cross-section that will amply repay the serious student and keen manufacturer.

A.D.

* * *

MANCHESTER ROYAL EXCHANGE DIRECTORY—1961. Richard Collinson Ltd., 15 Cross Street, Manchester 2 (price 42*s*.).

Characterised by its usual thorough revision, this sixty-sixth edition maintains its customary high reputation for accuracy although some well-known firms names have disappeared as a result of the contraction through redundancy.

Containing essential information about the Exchange itself, officials, fees, facilities and bye-laws, it also has complete lists of firms represented, members and honorary members. Other lists include cotton and rayon doublers, manufactured goods, holidays in the cotton trade, etc. There is a classification of cotton spinners and manufacturers, waste spinners and manufacturers, also a classification in towns of cotton spinners, and manufacturers, doublers, bleachers, dyers and finishers. The volume is invaluable to all connected with the Lancashire textile industry.

A.D.

* * *

THE EUROPEAN COMMON MARKET AND THE EUROPEAN FREE TRADE ASSOCIATION. J. E. Wild. Library Association, Chaucer House, Malet Place, London, W.C.1. (Special Subject List No. 35.) 1961 (price 2*s*. 6*d*.).

One of the most complex and immediate problems facing us today is the extent of our participation in the various schemes of European co-operation and in particular the European Common Market. This has not only to be determined nationally but many individual industries and firms are faced with making far reaching decisions. There is no dearth of written information available, however, for those who have to make these decisions and this bibliography by Mr. J. E. Wild, Sub-Librarian, Manchester Commercial Library, selects some 360 significant items from the extensive literature which has appeared during the past few years. Roughly, half are separately published works and the rest important periodical articles. Many aspects of the subject are covered, including marketing, investment, company law, tariffs, labour, restrictive practices, taxation, banking and subsidies. There is a judicious balance of European and American opinion in the choice of foreign publications cited. A short introduction gives a succinct survey of the efforts to draw Europe economically closer from the time of the German Zollverein to the Stockholm Convention.

* * *

A MODERN RUSSIAN READER FOR TECHNICAL COLLEGE STUDENTS. Edited by N. S. Fudel. Prepared from the Russian by D. G. Fry, B.A. Published by Pergamon Press, Oxford (price 35*s*.).

As a course of study this is both practical and attractive. The original course, from which it has been adapted, is used in Russian colleges to improve the language knowledge of their foreign students and it must have been found successful in practice. This English adaptation by D. G. Fry, B.A.(Hons. Lond.) is furnished with headings, exercises on the text and notes on difficult words, and makes the book suitable for classroom use by a teacher. The private student could also employ the text very profitably to improve his ability to read journals, text-books, etc., of a technical nature, but if he attempted the English into Russian exercises in Part 2 he would not be able to check his own work.

There is a considerable quantity of reading matter, set up in the normal Russian letterpress and, what is so necessary for students, marks of accentuation on each word. The reading lessons are of a reasonable length, on varied subjects and pleasantly arranged. It is not difficult Russian, and this has been achieved at the expense of style rather than vocabulary, the grammar being simple and the sentences straightforward.

The Russian compilers seem to have envisaged the adolescent student when choosing the topics for the readings. A more mature reader might feel sometimes that it is too much like a school lesson book. However, the technical words which are judiciously introduced into the text associate themselves naturally with simple and fundamental ideas on science and technology and this is a valuable feature of the course.

Much useful information about Russia is acquired incidentally, and the technical vocabulary in the possession of the student on completing the book could be described as generally useful for all branches of industry. The acquisition of the enormous number of specialised terms used in particular trades is not attempted. Perhaps a comment on the printing of the book is called for. Unfortunately, for the very good reasons explained on the first page, the publishers have not been able to re-set the whole book by letterpress, photo-litho and a non-letterpress being used for chapter headings and exercises. Whilst this is not pleasing to the eye, it is none the less perfectly legible, and does not materially affect the usefulness of the work as a study-book.

R.H.

* * *

REVISED STANDARD FOR COTTON AND HEMP LINES. British Standards Institution, 2 Park Street, London, W.1. (price 5*s*.).

A new edition of B.S. 2019 lays down tests for the manufacture and finishing of cotton and hemp lines. Tex values of yarns are now given, where applicable. Three ranges of hemp lines and one cotton are provided. The hemp lines comprise a range of 10 in 40 yd. lengths (hawser laid), a range of 5 fishing lines and 21 miscellaneous lines. The cotton lines comprise five types.

The specification deals with quality of material, manufacture, make-up, testing, rotproofing and identification marking.

Catalogues

SOLENA INTERLININGS.—The second in the series of booklets describing Solena interlinings is now available from Bonded Fibre Fabric Ltd., Henrietta House, 9 Henrietta Place, London, W.1. Dealing with the use of Solena in men's wear, it gives hints to the clothing manufacturer on how to handle the material. This introductory section is followed by information on the use of Solena for interlining jackets, raincoats, overcoats, blazers and tropical wear.

* * *

DYESTUFFS. Two new publications (C.D.C. 88) Cibacet Orange GF Micro Disperse (greenish orange) and (C.D.C. 89) Cibacet Orange RF Micro Disperse (reddish orange) are available from Ciba Clayton Ltd., Manchester 11. Recommended by the company for dyeing polyester and polyamide fibres, secondary acetate and Triacetate rayon, the main features cited are high fastness on all substrates, especially hot pressing, pleating and sublimation. In both cases preparation and dyeing procedure are detailed and examples are shown on "Terylene" slubbing and nylon, secondary acetate and triacetate rayon fabrics.

BOAC proves the proverb wrong...

'CHUNKY CHICKS' put all their eggs in one basket

Chunky Chicks (Nichols) Ltd. of Scotland rely exclusively on air freight to get their chicks and hatching eggs to overseas markets in tip-top condition.

Facts and figures prove this confidence to be well placed.

FACT: Results of incubation of eggs flown to Boston by BOAC were as good as those hatched at home under similar conditions.

FIGURES: In a typical consignment of 1,080 eggs flown to the States by BOAC, only one arrived cracked.

If *your* company's products require this kind of careful handling and speed in transit, it will pay you dividends to get in touch with BOAC. To North America alone, there are over 80 cargo-carrying services a week this summer.

BOAC's World-Wide Export Advisory Service offers you informed guidance on marketing and distribution developments in over 150 trade centres throughout the world. Phone your nearest BOAC office.

B·O·A·C

helps speed the export drive

BRITISH OVERSEAS AIRWAYS CORPORATION WITH ASSOCIATE AIRLINES

Textile Trade and Prospects

Cotton Trade Uncertainties

The beginning of the annual holidays in Lancashire spinning and weaving sections has naturally coincided with a noticeable decline in trading conditions. Just prior to this interest had been decidedly better in most types of yarns and cloths, and the delivery position had eased considerably. Complaints were heard occasionally that the margins on some orders were poor but most managements were glad to maintain machine activity at almost maximum figures. In the last week or so demand had dropped appreciably and evening shifts at some mills were temporarily discontinued. It is hoped that this is only a passing phase but the continued high level of imports of yarn and cloth create apprehension amongst workers and employers alike. Uncertainty concerning the future of the agreements on exports and imports, added to the present international situation, causes grave disquiet and these three main factors are the main causes for the lack of confidence in trading circles.

In spinning circles, short term buying has been much in evidence although inquiry has covered most available counts and qualities. One pleasing feature has been the apparent stability of raw material prices and selection. Most of the orders put through have been for standard weaving types in coarse and medium counts on cones, ring beams, and cheeses. Combed mule doubling wefts have not received the support expected and a little of the recovery arising from the machinery scrapping programme has been lost in recent weeks. Coarse twists are in good demand but in every case firm orders only materialise with the certainty of early delivery as an incentive. Hosiery specialities are moving satisfactorily but in this section also support has tended to ease off because bookings amongst manufacturers for autumn and winter have not been quite as good as anticipated. Home trade accounts for mixture yarns cotton/rayon, cotton/nylon, cotton/"Terylene" and other blends have remained exceptionally good and order books for these look like remaining satisfactory for a long time ahead. The off-take of novelty and fancy effect yarns has kept pace with productive capacity with fancy twists and slubs in good request.

Conditions in cloth circles have been distinctly quiet with no one apparently keen to operate much ahead. Most firm sales have been of modest proportions, the greater bulk—on home trade account—being for a wide range of dress and other apparel cloths in medium quality woven dobby and jacquard styles and a tremendous variety of screen and roller printed designs. Sound construction allied to excellent imagination in design is doing much to uphold Lancashire prestige in these extremely competitive spheres. Furnishing fabrics are in moderate demand and here also, orders seem to have been fairly equally shared between woven and printed cloths in the medium to better price ranges. Household textiles are having a quiet period but hopes are expressed that the summer sales in retail sections will trigger-off some repeat lines in many types of terry cloths including hand towels, bath mats, also in sheetings, quilts, tablecloths, napery, etc. It is surprising that in these fields that the frequently recurring novelties soon die and interest remains undiminished in the known and respected qualities. Industrial fabrics have been moving too slowly these past weeks and much more business would be welcomed and at the right price for both. Turnover in all sections could be regarded as fairly satisfactory for this time of the year but an uneasy atmosphere is the biggest single braking force at the movement.

Wool Textile Activity

Activity in the free world wool textile industries in 1960 was slightly higher than in the previous year, states a statistical report by the Commonwealth Economic Committee. After reaching a peak in the first quarter of 1960 activity tended to fall. In the final quarter it was more than 5% lower than at the end of 1959. The position varied between one country and another, with marked improvements in Italy and Japan, lesser gains in France and Belgium, and falls in the U.K., the U.S., Argentina and certain other countries. International trade in raw wool and tops was lower than in the previous year, though yarns and fabrics showed further increases. Total wool imports by 14 major consuming countries declined by about 6% compared with 1959. Wool tops exports were 4% below the previous year's peak, but woollen and worsted yarn exports rose by 12%—establishing an all-time record. Exports of wool fabrics rose by 5%.

Ten of the leading manufacturing countries of the free world together used 2% more wool in the first quarter of this year than in the preceding quarter. Figure was 498·5 million lb. (clean weight), compared with 490·1 million lb. in the October-December quarter. Commonwealth Economic Committee reports that in both the U.K. and the U.S. the increase compared with last quarter was 6% and in France 3%. These increases were more than sufficient to offset slight declines in Japan, Italy and Germany. Compared with the high level of wool consumption ruling in the first quarter of 1960, however, total wool usage in January-March this year still showed a decline of 6%. World output of wool and hair tops last quarter was 4% higher than in the previous three months, one of the biggest increases being in the U.K., where the daily rate of top production rose by about 8%. The U.S. recorded a marked rise in production of all three products—tops, yarns and fabrics—following the low figures of recent quarters.

U.K. wool consumption during April was 7% higher than in March, and 2% higher than a year earlier, reports the Wool Industry Bureau of Statistics. Compared with a year ago, top production was 5% higher, and worsted yarn deliveries 8% higher, while wool cloth deliveries also showed a slight overall increase. An improvement of 5% in worsteds was partly offset by a slight decline in woollens. Output totals for April were: wool consumption, 38·35 million lb.; top production, 25·79 million lb.; worsted yarns delivered, 19·20 million lb.; woven fabrics delivered; 24·64 million sq. yds.; blankets delivered, 1·88 million sq yds. Raw wool imports into the U.K. in the first four months of this year totalled 288·1 million lb. (actual weight), compared with 259·4 million lb. in the corresponding period of last year, an increase of about 10%.

Linen Trade Review

Two events of considerable significance during the past month were the decision by ordinary shareholders of the York Street Flax Spinning Co. Ltd., Belfast, to accept a recommendation of the Board that the company be wound up. The second was an exhibition of flax/man-made fibre blend products, staged by L.I.R.A., Lambeg, in conjunction with Courtaulds Ltd., the emphasis being on blends of flax with "Tricel" and "Courtelle," Courtaulds' triacetate and acrylic fibres.

The success of the last-mentioned event helped to dispel the gloom consequent on the decision to close down a firm of such long standing and with such wide connections in the trade, and particularly the possible effect on the market of liquidating stocks valued at over £1 million. The display of over seventy fabrics at the exhibition in Lambeg, considered in conjunction with a similar exhibit staged last year by the L.I.R.A. in collaboration with I.C.I. emphasises the contribution which man-made fibres can make in directing output along more remunerative channels, and in bringing idle machinery back into production.

The York Street decision has emphasised the fact that new buildings and equipment do not necessarily provide an answer to the problem of shrinking markets. Following destruction by enemy action during the war the York Street mill was rebuilt and largely re-equipped in post-war years, being consequently the most modern unit in the trade. The cause of its failure to meet the exacting demands of post-war world markets is due in part to the fact stated in the Board's letter to shareholders that "the greater part of the machinery is suitable only for the manufacture of linen and any large scale diversification into other products is considered impracticable."

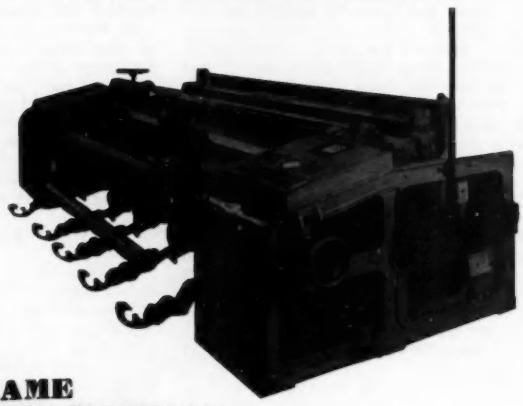
This emphasises the need for imaginative planning to meet modern market requirements, taking into consideration the impact of man-made fibres on the old established natural fibre industries. The linen industry has acquired considerable experience in processing man-made fibres on standard flax equipment, and the range of yarn production has been extended by modifications in machine design and in processing techniques. In this textile machinists have co-operated with spinners to their mutual

BOUCHER MACHINERY for the CARPET INDUSTRY

HYDRAULIC BEAMER

Lockheed Hydraulics enable constant pressure to be applied to beam rollers, from nothing to 1,000 lbs. per square inch, each side controlled independently. Constant Peripheral Beaming Speed throughout entire range of beam, from 6" diam. barrel to 36" diam. flange, at three different speeds. Totally enclosed oil immersed Constant Speed H-Gear Unit. Warp Length guaranteed. Machine automatically cuts out at any pre-set yardage for any number of beams until re-set.

Tube frame threaded with the spool in its spring holders: eliminates four operations (patents pending). Needles are brought forward by simple foot operated switch, leaving operatives' hands free to attend to interrupted ends and return to thread by the same operation. Tube frames can be threaded as fast as removed from the chain, thus facilitating immediate return to their last position in the chain. All needles have rounded crochet hook ends, preventing yarn damage and enabling smoother threading. All spool end strive difficulties overcome enabling, 100W threading even if strive is as much as 1" by our new full length comb. By fitting side supports the standard 4/4 machine can thread 2/4 to 16/4 Tube frames, or a machine can be supplied 12/4 in width. Tube Frame automatically clamped eliminating still a further hand operation.



TUBE FRAME THREADING MACHINE

"CONSOLE" HIGH SPEED CARD CUTTER

Easier to use than a type-writer! Operator can be trained within an hour. Quick and simple method of colour selection only 1½ inches from the design paper. Automatically stops when card is cut, automatic numbering device, centralised lubrication system, high cutting speed and rapid conversion to other card sizes. Operator fatigue reduced to a minimum for the machine takes care of the Brainwork.

Boucher AND CO. LTD.

PIKE MILLS · NEW ROAD

KIDDERMINSTER · WORCS.

Telephone No.: KIDDERMINSTER 4711 (10 lines)

advantage, as evidenced by the range of blend and all man-made fibre products now being made in the trade, and which are finding a ready market.

While the seven-point programme, recently announced, which is intended to stimulate the U.S. textile industry, is unlikely to increase materially linen production in that country, the decision to expand research for new products, processes and markets, and with emphasis on the need to make U.S. output competitive in price and quality must inevitably re-act on demand for linen in a consumer market which is becoming increasingly price conscious. The problem of making linen competitive on a price basis still awaits a solution, though Continental manufacturers are giving it serious consideration and are evolving means for short cut processing that are ensuring them a definite lead on their British rivals.

The effect of competition has been felt most keenly in the wet spun section of the trade in this country, which still has a considerable percentage of idle capacity despite the closures of recent years. The Scottish dry spun section is more fortunately placed. Most mills are working to capacity with well-filled order books. Reviewing progress in his statement to shareholders Mr. H. V. Bonar, chairman of Low and Bonar Ltd., Dundee, stated that with regard to their linen manufacturing activities the turnover in 1960 had been well maintained. This had continued during the current year, and with a good forward order book, the main difficulty was to produce enough goods to satisfy demand.

Latest reports from flax growing centres indicate that the current crop continues to make good progress. If these are maintained during the rest of the season yield and quality should exceed the average of recent years. Output by scutch mills has reached the summer "low." Quality is also in the same category and is mostly dew ret.

Jute Fibre Position and Prospects

At the end of May the E.P.C. values of old crop fibre were reduced by £4 per ton and new crop for July/Aug. shipment by £5 but these lower rates made no impression as buyers were still looking for lower prices. The fact that sellers were willing to accept up to £22 per ton below the official rates for July/Aug. shipment did not bring confidence to the market. Cyclones in Pakistan last month did little damage to the growing crop and good weather conditions continue, the out-turn of fibre should be sufficient to meet all requirements with prices returning to a more realistic level. This irregular position always happens at this time of year because of the difference in value between old and new crop fibre. However, on this occasion the difference if much more pronounced because of the very high prices which have been forced during the past season.

The quantity of old crop fibre now available is small and most sellers are still offering at E.P.C. levels. With a difference of £15 per ton in the official prices of old and new crop jute, this shows the trend that is likely to take place. However, there are sellers of new crop white jute at £22 per ton below the ruling E.P.C. values for July/Aug. shipment and heavier discounting is taking place for shipment further ahead.

This discounting of the market for forward shipment should prevent too big a demand developing for early shipment fibre and buyers will restrict purchases to essential requirements at the beginning of the season. It has been feared that prices of raw jute would remain at a high level because of an expected large demand for early shipment new crop as spinners stocks by that time would be low. However, demand for yarns and cloth in the past three months has been below average and stocks of raw material held by producers have lasted longer than anticipated.

Offers are being made at £172 10s. for Mill Firsts, at £165 for Mill Lightnings, at £160 for Mill Hearts and at £155 for grade Hearts c.i.f. U.K. for June/July shipment, at £163, £150, £145 and £140 July/Aug., at £153, £140, £135 and £130 Aug./Sept. and £10 per ton less would be accepted for shipment a month further ahead. This discounting of the market in the forward position is bound to restrict buying which in turn will force prices still lower. Due to types of weather conditions which can be experienced in East Pakistan no one can be sure of the ultimate out-turn of the jute crop but at present there are good prospects that the quantity of fibre which will be available should bring prices still lower.

Small quantities of new crop material are now being bought by U.K. spinners but the main interest is shown to sellers who are in a position to guarantee that shipment will be made by a specified date. So far as old crop fibre is concerned, there is no interest shown by Dundee spinners as they have sufficient stocks to carry them over until the next crop is available. As a matter of fact there have been sales made ex-Dundee stocks to Continental spinners who are in need of immediate supplies. Offers of old crop jute are being made at £196 for Mill Firsts, at £184 for Mill Lightnings, at £180 for Mill Hearts and at £177 for grade Hearts for June shipment. Grade Tossa-2/3 was available at £186 and grade Tossa-4 at £181 10s.

The Calcutta goods market has also become much easier despite the fact that some mills may have to further reduce production because of a possible shortage of raw material. Prices are at 78/- for 10 oz. 40 in., and at 60/6 for 7½ oz. per 100 yds. f.o.b. Calcutta for June shipment, at 77/6 and 59/9 July/Sept. and at 70/6 and 53/3 Oct./Dec. B twills were at 239/3, 233/3 and 203/9 for the respective shipment periods. The cheaper prices offered for shipment during the last quarter of the year is due to the fact that new crop raw material prices are expected to be much lower than current rates. The selling rates of imported jute goods in the U.K. have been reduced on several occasions during the past month. There have been further requests to the Government for another reduction in the mark-up on imported goods. At present this stands at 20% and so far no alteration has taken place.

There is still a great scarcity of orders for yarns and cloth at Dundee. Short-time working shows little improvement and can be expected until prices reach more attractive levels. At present buyers are limiting purchases to requirements and show no interest in the forward position. There is no doubt that a potential demand is building up as stocks in consumers' hands are low. The heavy end of the trade is in the same position with very little buying interest shown for sackings and tarpaulins.

Silk and Man-Made Fibres

Demand for all man-made fibres has been well maintained and indeed there is an indication that an overall improvement has taken place compared with recent months. Demand has improved fairly well all round but tyre cord manufacturers report increased demand, and carpet producers are ordering at a better level than for some time since 1960.

So far as Lancashire is concerned, there is still, of course, competition for the man-made fibres in the form of cloth imports, but with the clearer pattern emerging in Lancashire, following on the reorganisation scheme, it seems clear that cotton, rayon, and blends are finding a good outlet and the consumption of rayon staple for ladies' and men's suitings is very encouraging and does not seem to have been seriously affected by the recent price increase of viscose rayon yarns.

A wide range of dress fabrics are in good request with noticeable continuing popularity for filament acetate, especially in the large printed floral designs, which seem to have returned to general favour. The Yorkshire trade reports steady demand from the Midlands particularly for most classes of hosiery yarn and specialities. Demand, too, for linings is said to be still higher than the existing supply. This state of affairs has continued for some time with little likelihood of any change. Indeed, current demand for coloured linings for men's proofed coats is continuing to strengthen the already high call.

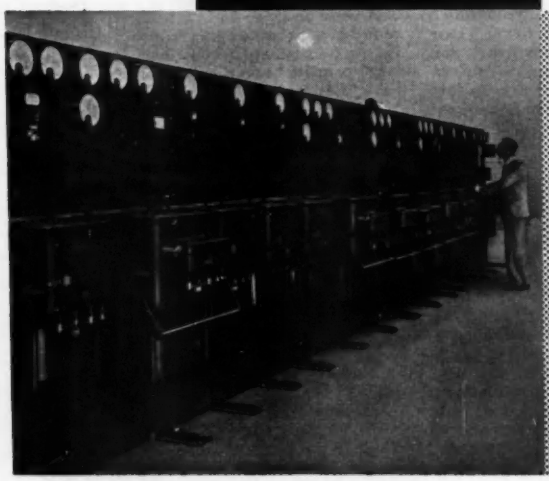
In the Macclesfield/Leek areas, throwsters are quite active and silk is in steady demand. It has fully maintained the position attained in 1960 and demand appears likely to rise even higher yet. The call for bulked yarns, modified filament yarns, although still good, does not appear to have increased greatly but is maintaining a steady position. For the autumn trade steady business has been booked for standard lines, such as ties, handkerchiefs, in printed styles and narrow fabrics, smallwares, petershams, gimps and ribbons are all more or less in request. The call for nylon laces has expanded and the demand for sewing threads in cotton/"Terylene" blends grows steadily. Knitters remain active with most styles for children's wear and in ladies' cardigans and jumpers good use is being made of fibres such as "Courtelle" and "Acrilan" and "Orlon." Makers-up are reasonably employed and warp knitting is one activity showing steady expansion, not only in the Leek area but also in Lancashire and Yorkshire. From time to time firms traditionally recognised in the weaving side of the business are installing some warp-knit machines with a view to developing this side of their business.

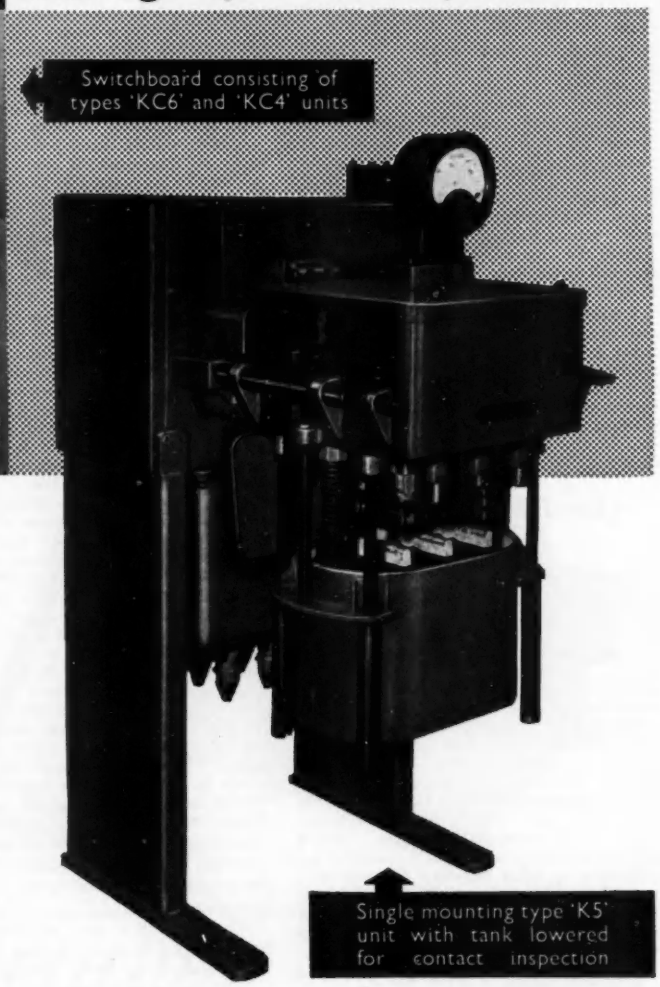
Reports from the Midlands indicate increased demand for seam-free hose and the extent to which this may develop further is a matter for conjecture. Approximately three-quarters of ladies' hose being sold is said to be seam-free. This is possibly on the high side but indicates the extent of the demand. The view has been expressed that the trade may be guilty very soon of over-production. Margins are slender, but the turnover is very high. The demand for knitted underwear in wool/nylon and all/nylon is said to have fallen and competition from imported knitted goods continues to be severe but the steady home output is an indication that the industry is holding its own.

TYPES K & KC

Industrial Switchgear

Rating - up to 660 v./ 2000 A.





Switchboard consisting of types 'KC6' and 'KC4' units

Single mounting type 'K5' unit with tank lowered for contact inspection

Types K & KC Switchgear have been specially designed to provide a reliable power supply for industrial and commercial needs where the rating required is not in excess of 660 V - 2000 A.

The Switchgear is available for pedestal or cubicle mounting and incorporates horizontal drawout circuit-breakers suitable for the control of all main and auxiliary power supplies.

Their unit construction permits single or switchboard mounting to meet individual requirements.

For further particulars write to AEI switchgear Division, Higher Openshaw Manchester, or to your local AEI office

AEI Associated Electrical Industries Ltd.

Switchgear Division

HIGHER OPENSHAW, MANCHESTER : TRAFFORD PARK, MANCHESTER : WILLESDEN, LONDON

F/A778

Notes and News

Industrial Work of Reference Valuable Aid to Trade

A new British company, Kompass Register Ltd., is now undertaking the compilation and publication of one of the most ambitious works of reference for industry and commerce ever to be introduced in this country. This new work, which is to be called Kompass Register, is stated to be an authoritative and comprehensive register to combining in one publication a detailed list of the products of all sections of British industry, ingeniously cross-referenced to the companies manufacturing these products. There is also a section giving full information about the companies themselves. Details of commercial services such as banking and insurance are also included in the register. Furthermore, the index and the products and services classification will be in five European languages. Much of the information in the company information section will also be in foreign languages.

It is estimated that the first British edition will contain detailed information concerning approximately 25,000 firms employing 50 people or more and will consist of at least two, but more likely three volumes. The register is to be revised and re-printed annually, and it is planned by the third edition to include all manufacturing companies employing 10 or more people, some 45,000 to 50,000 firms in all. Particularly important is the classification system which enables the reader to see at at glance a range of up to 50 products in any one grouping of allied products. These are put in chart form against the name of manufacturers or suppliers and all this information is published free of charge.

* * *

"Tricel" Fashion Fair

A "Tricel" Fashion Fair is to be presented by British Celanese Ltd., from October 10 to 13th, 1961 in the Fashion Theatre, Celanese House, Hanover Square, London, W.1. The Fair will show retail fashion buyers garments which will be featured in the "Tricel" Spring 1962 national advertising campaign, also a comprehensive selection of garments made from "Tricel" and "Tricel" blends.

* * *

Good Order Book

Although some anxiety is being felt about the heavy imports of foreign goods in the home market, Mr. G. Livsey (chairman, Mutual Mills Ltd., Heywood) was optimistic at the recent annual meeting. "I do not forsee anything like a major setback. We have a good order book, although there may have been a little over-buying, and some people have got slight indigestion and are taking up supplies rather slowly," he said. The labour position had become rather difficult but every effort was being made to recruit operatives. Regarding re-equipment, he said the directors were watching the position carefully. Orders for new plant had not been placed extensivley at the moment but further contracts would probably be entered into towards the end of the year.

Textile Developments Employ Glycerine

A process for stiffening nylon (U.S. Pat. 2,692,182) required a strongly acid solution and neutralisation destroyed the effect. A new procedure calls for the use of an ammonium salt of an acrylic acid polymer, plus a polyhydric alcohol. As an example, a nylon twill fabric was passed through a solution which contained the ammonium salt of 4·5 parts of an acrylic polymer and 1·5 parts glycerine in 94 parts of water. When dried and baked at 150°C., a stiff finish resulted which resisted 15 min. in dry-cleaning solvents. (U.S. Pat. 2,899,341).

Another treatment for cotton and rayon fabrics ("Tex. Res.", Jan., 84) involves cross-linking with divinyl sulfone, using various concentrations of glycerine, sorbitol, urea and other additives to increase the weight gain.

A process to raise the safe ironing temperatures of cellulose triacetate fabrics includes di-esters of glycerine, or of certain glycols, among the materials employed. Goods may be worked in a bath that contains 30% of glycerol diacetate for 3 hours at 60 to 99°C. (B. Pat. 852,729.)

* * *

Caprolactam Production

Courtaulds Ltd. intend to build plant for the production of 10,000 tons a year of Caprolactam, used in nylon manufacture under the process acquired from their associated company, Snia Viscosa, Milan. This process, based upon Toluene, is said to be the most economic process.

* * *

Change of Name

The name of Drayton Regulator and Instrument Co. Ltd. has been changed to Drayton Controls Ltd. The telephone number remains West Drayton 4012.

* * *

Antistatic Finish for Synthetic Fibres

Cirrasol Z, a new antistatic agent (a speciality of I.C.I. Dyestuffs Division) consists of a somewhat viscous aqueous solution of a cationic polymeric compound and can be used alone—at the rate of 1 - 1·5% for fabrics of filament yarn and of 2 - 3% for fabrics of spun yarn—to give a satisfactory durable antistatic finish on synthetic fibres. Maximum durability is achieved, however, by giving the fabric a further treatment at about 35°C. with soap or a detergent of the sulphated fatty alcohol class. Application is by padding, using a Cirrasol Z solution at an appropriate strength to leave the correct amount of agent on the fabric, which is then dried prior to being padded again through a solution of soap or sulphated fatty alcohol detergent.

* * *

New Dyestuff for "Terylene," etc.

Dispersol Fast Yellow T, a new homogeneous disperse dye, announced by I.C.I. Ltd., for use on "Terylene" and other polyester fibres, is also of interest for dyeing and printing secondary acetate and triacetate rayons. On all three fibres it produces bright greenish yellow shades of excellent all-round fastness. Disperso Fast Yellow T is recommended for use on 100% polyester fibre and for dyeing the polyester component in blends with wool, cotton, linen or viscose rayon. It is suitable for dyeing either loose stock, slubbing, yarn, hosiery or woven piece, and may be applied in dyeing machinery of all types. On secondary acetate and triacetate rayons, shades of high fastness to light, gas fume fading, perspiration and washing are produced. In addition, shades of excellent heat fastness are obtained on triacetate rayon.

* * *

I.C.I. Acquire Nylon 6 Rights

An agreement has been concluded whereby I.C.I. Ltd. has acquired rights for the technical information and patents relating to Emser Werke/Inventa's new processes for the manufacture of nylon 6 polymer and of caprolactam, upon which nylon 6 is based. I.C.I.'s design work is well advanced and production will commence early in 1963. Caprolactam will be made initially in a plant of 15,000 tons per annum capacity to be erected on I.C.I.'s Severnside site, and will be available for general sale. Concurrently a large-scale plant will also be built for the manufacture of nylon 6 polymer.

* * *

New Bri-Nylon Carpet Fibre

A new Bri-Nylon carpet fibre, designed specially for blending with wool, is being launched by British Nylon Spinners Ltd. Leading British carpet firms have reached an advanced stage with plans to launch new ranges incorporating the new carpet fibre. Axminsters containing about 20% of nylon are expected to retail at prices similar to those for comparable all-wool qualities and trials are reported to have shown they have two to three times the wear life. The new carpet fibre is medium crimp, heat set nylon staple and will be available in 2½- and 4-in. staple lengths. Carpets in suitable constructions incorporating the new carpet fibre will be eligible for inclusion in the B.N.S. branding scheme which already embraces all-nylon pile carpets, upholstery fabrics and sheets as well as clothing.

* * *

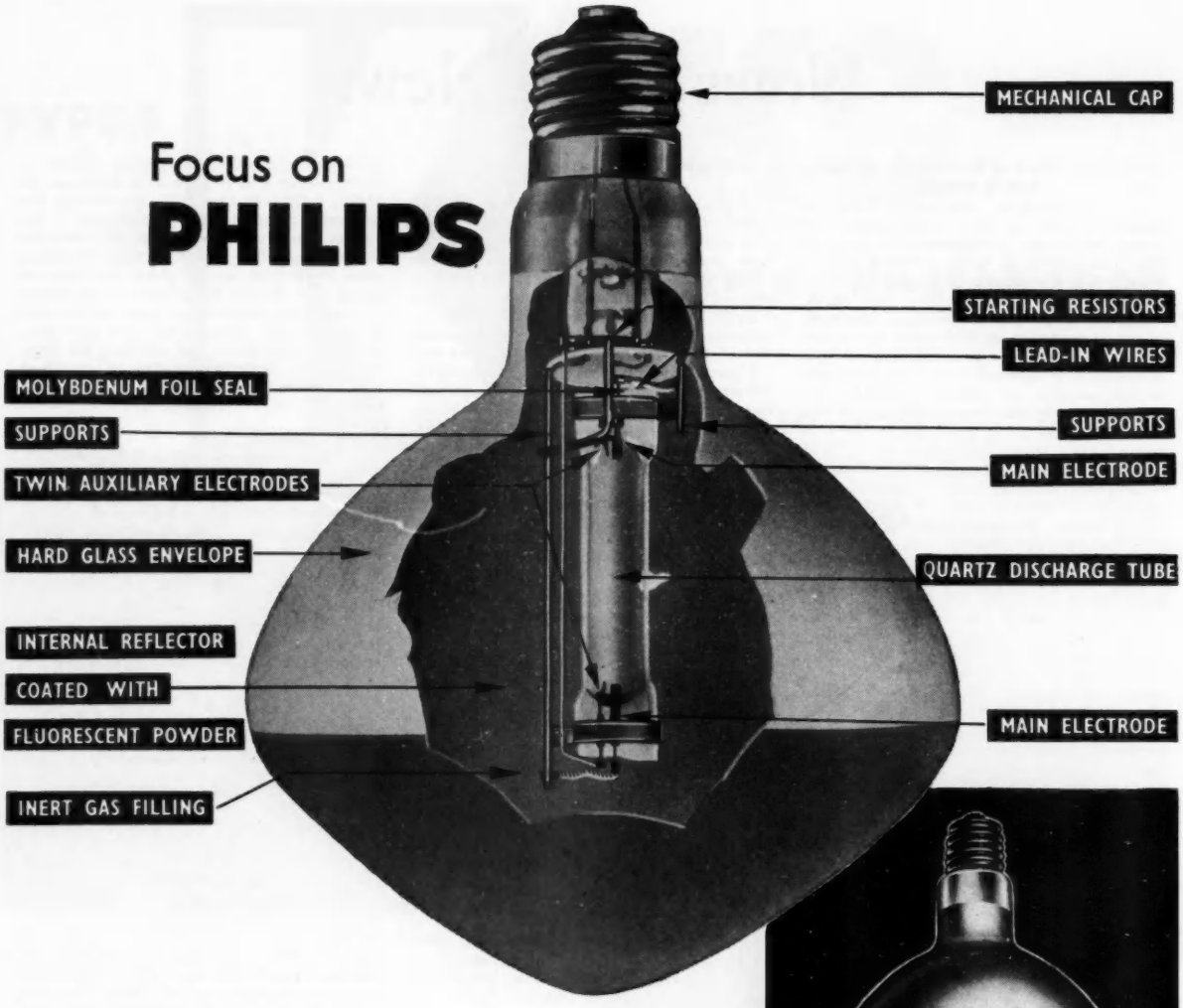
Controlling Moisture Content

A new moisture measuring unit for use with automatic electronic instruments is announced by Honeywell Controls Ltd., Greenford, Middlesex. Known as the Moist-O-Graph, it permits moisture content percentages previously considered unmeasurable to be both measured and controlled; it is claimed that moisture contents above 40% can be controlled in paper applications.

The new unit is for use in the paper, textile, etc. industries. Moisture content is controlled by detecting the changes in resistance as the product passes between two conductive surfaces; for example, between a machine roller and a detector roller or a metal chute and a probe.

There are five models of Moist-O-Graph giving facilities ranging from simple measurement up to complex cascade control. The controller instrument may be

Focus on
PHILIPS



MERCURY FLUORESCENT LAMPS
with Internal Reflector

(Made in Holland)

First in Great Britain with this new class of lamps, available in 250 and 400 watt ratings. All the advantages of Philips Mercury Fluorescent lamps are built in, but the outer envelope forms a highly efficient reflector. The lamp is its own fitting.

The mechanically made high pressure quartz discharge tube is mounted by an exclusive system which defeats light wastage, vibration and reduces the number of working parts. It is sealed in nitrogen and is filled with argon and mercury; special features are twin auxiliary electrodes to ensure reliable ignition even at temperatures as low as 40° C.

An exclusive new capping process screws the glass into the cap without cement. Excellent colour correction and high light output are blended and directed by the internal reflector which ends maintenance problems.

- *Built in reflectors defeat dust and dirt.*
- *Simpler fittings – mechanical protection only.*
- *No voltage grades – 200/250 volts eliminates stock problems.*
- *Universal burning position.*
- *Special phosphors ensure good colour.*
- *Mechanical caps – no cement means no loose caps – ever!*
- *Mechanical manufacture of all components ensure extreme reliability and quality constancy.*

PHILIPS

PHILIPS LEAD THE WORLD IN LIGHTING

PHILIPS ELECTRICAL LTD · LAMP & LIGHTING GROUP · CENTURY HOUSE · SHAFTESBURY AVE · LONDON WC2

(LD33P6)

installed remote from the detecting and transmitting units. The 0 - 10 millivolt transmitter output can be fed into any compatible instrument for indication, recording, control or retransmission.

* * *

New Data on Acrylonitrile

A new 25-page booklet, describing the properties and use of acrylonitrile is announced by the Chemicals Department, Union Carbide International Co., 270 Park Avenue, New York 17, New York, U.S.A. Included is information on physical properties; reactions; applications, specification limits; test methods; storage, handling, and shipping; toxicological properties; and selected literature references. Acrylonitrile, a colourless volatile liquid, is only slightly soluble in water but miscible with many organic solvents. Because of the double bond and nitrile group, many paths of chemical modification are possible. As a monomer or comonomer for synthetic textile fibres, acrylonitrile allows polymeric materials to form oriented fibres. Acrylonitrile also undergoes many reactions to yield solvents and plasticizers; and to yield intermediates for dyes, pharmaceuticals, and insecticides.

* * *

New Emulsion for Paper Coating

Availability of a new emulsion (Primal R-9) for paper coating was recently announced by Charles Lennig and Co. (Great Britain) Ltd., 26-28 Bedford Row, London, W.C.1, subsidiary of Rohm and Hass Co., Philadelphia, chemicals manufacturer. This product, an acrylic-modified vinylidene-chloride emulsion, is highly stable and is said to have unusually good film-forming characteristics. Applied to paper or paperboard by standard coating methods, this emulsion forms films which offer exceptionally good water, solvent, grease, scuff and block resistance. They also provide an excellent water-vapour barrier. Conventional coating equipment, such as air knife coaters, roll coaters, trailing blade coaters, and spray systems, should be suitable for use in applying the films. Primal R-9 is said to have relatively low foaming characteristics.

* * *

Production of Man-Made Fibres

Though production of man-made fibres in May was still at a modest level compared with the high levels of output during much of 1960, there was a rise of nearly 6 mn. lb. compared with April, when production was affected by Easter holidays, according to statistics issued by the British Man-Made Fibres Federation. The May total at 46·03 mn. lb. was somewhat above the average for the first five months of this year and compared with 42·17 mn. lb. in April, but with 51·99 mn. lb. in May last year, the second highest figure on record. Output of filament yarn at 22·81 mn. lb. showed comparatively little change in the average daily rate this year, and compared with 20·71 mn. lb. in April and 23·54 mn. lb. in May last year. There is a particularly brisk call for acetate filament yarns, and demand for rayon filament yarns is at a satisfactory level in textile and tyrecord types. Output of staple at 23·22 mn. lb. compared with 21·46 mn. lb. in April but with 28·45 mn. lb. in May last year, and again reflected limited short time working at the largest rayon staple factory to counterbalance some accumulation of stocks.

New Adhesive Technique for Fabrics

A new technique for coating fabrics with any kind of pressure-sensitive adhesive has been developed by Leonard Stace Ltd. of Cheltenham. The process, it is stated, can be applied to both man-made and natural fibres and is said not to affect in any way the natural flexibility of the materials or to cause "strike-through." A pilot production plant is now in operation following experimental work between the Cheltenham firm and a well-known textile company. Immediate facilities are available for producing up to 50,000 yds. of coated cloth per week and this can be extended as required.

The adhesive-coated cloth has a paper backing which strips off easily to leave the cloth ready for fixing simply by finger pressure. To facilitate the cutting of the fabric to the required size and shape the backing paper is overprinted with inch squares. The first applications are likely to be coated velvets and similar materials for the lining of jewellery and cutlery boxes where the speed and convenience of a precoated cloth and absence of "strike-through" are important factors.

* * *

Keen Demand Releases Wool Stocks

Sustained upward trend in wool prices in April—7½% up on March—enabled the South African Wool Commission to sell 14,000 bales of its accumulated stocks of 99,000 bales. According to the commission's monthly market report, the country's clip realised £41 million—£6 million less than a year before—in the first ten months of the current season. Average price was 37*d.* a lb. By the end of April Britain, traditionally the main buyer, was drawing ahead, with purchases of greasy and scoured wool totalling 42 million lb. France took 38 million lb., Germany 33 million and Italy and the United States 23 million lb. each.

* * *

T.I. Conference in Holland

The Textile Institute is arranging a special conference in Scheveningen, Holland, from September 7 to 12 on the subject of crease-resistance and crease-recovery in fabrics. Papers to be given include one by Dr. F. O. Howitt and A. N. Davidson, of the Wool Industries Research Association, on experimental development of methods for the production of durable creases and crease-resistance in wool fabrics.

New Companies

Khedoory Ltd. Private. Reg. Mar. 22. Capital £1,000. Manufacturers of wool and woollen goods etc. D. Khedoory, F. Khedoory, G. W. Bussell. Registered Office: 33 King Street.

H. G. Attwood and Son Ltd. Private. Reg. Mar. 21. Capital £1,000. Cotton piece goods manufacturers. H. G. Attwood, Mrs. M. Attwood and N. A. Attwood. Registered Office: 24 Lever Street, Manchester 1.

R. Dawson (Dewsbury) Ltd. Private. Reg. Mar. 16. Capital £1,000. Burlers and menders, top makers, etc. H. Secker, R. Dawson. Registered Office: Firth's Yard, Mill Road, Dewsbury.

F. and E. Brown (Textiles) Ltd. Private. Reg. Mar. 15. Capital £1,000. Spinners, doublers, weavers, etc. F. Brown, 49 Newsome Road South, Berry Brow, Huddersfield and E. Brown.

Mafatlal (London) Ltd. Private. Reg. Mar. 13. Capital £200,000. Manufacturers and dealers in textiles and fabrics etc. A. N. Mafatlal, Y. N. Mafatlal, R. N. Mafatlal, H. B. Mafatlal, V. Navinchandra, Mrs. S. Bhagubhai, all of Mafatlal House, Back Bay Reclamation, Bombay, 1., India. Solicitors: Sanderson Lee and Co., 7 - 11 Moorgate, E.C.2.

Beazleys (Marlborough St.) Ltd. Private. Reg. April 5. Capital £1,000. Textile Merchants and dealers. G. C. W. Beazley, P. E. Dobinson. Registered Office: 23 Ganton Street, W.1.

N. K. Rahim Ltd. Private. Reg. April 10. Capital £5,000. Manufacturers and dealers in worsteds, tweeds, etc. N. K. Rahim and L. V. Rahim. Registered Office: 30 Brown Street, Manchester 2.

C. B. Dawson Ltd. Private. Registered April 25. Capital £5,000. Import and export of textiles. C. B. Dawson and Mrs. E. M. Dawson, Stanley Pope and J. B. Dawson. Registered Office: 50 Newton Street, Manchester.

R. S. Leage and Co. Ltd. Private. Reg. April 24. Capital £500. Manufacturers and dealers in textiles. R. S. Leage and D. C. Orders. Registered Office: 9 Bucklersbury, E.C.4.

Greenhill and Ellis (Eastern) Ltd. Private. Reg. April 25. Capital £20,000. Importers, exporters and manufacturers of textiles of all kinds, etc. J. E. Norton and C. J. A. Dixon. Registered Office: Ling House, Dominion Street, E.C.2.

A. Baguley and Co. Ltd. Private. Reg. April 19. Capital £3,000. General and textile machinists etc. A. Baguley and H. Hall, 349 Stockport Road, Denton, Manchester and J. T. Brown.

Lion Superfine Textiles Ltd. Private. Reg. April 12. Capital £5,000. Cotton spinners and doublers, etc. Y. B. C. Asghar, I. R. Harouni. Registered Office: 18 - 23 Holborn Viaduct, E.C.

D. E. Davies and Son (Textiles) Ltd. Private. Reg. April 13. Capital £10,000. Importers and exporters of fabrics etc. D. E. Davies and Mrs. V. Davies. Solicitors: Crawley and De Reya, 158 Fenchurch Street, E.C.3.

Jamestex Mill Ltd. Private. Reg. April 13. Capital £5,000. Manufacturers of textile goods. S. Gardner and E. H. Goulden, The Nicke, 7 Parkway, Wilmslow, Ches.

K. K. Mycock (Linens Manchester) Ltd. Private. Reg. April 12. Capital £1,000. Spinners, weavers, finishers, etc. K. K. Mycock and F. M. Mycock. Registered Office: 42 Rosslyn Road, Cheadle.

H. M. B. Machinists and Engineers Ltd. Private. Reg. April 17. Capital £20,000. Hosiery and other textile machine parts. A. A. Bown, Mrs. L. M. Bown and T. A. Bown. Registered Office: Premier Works, Nottingham Road, Somercotes, Derby.

Fudd and Waste Ltd. Private. Reg. April 14. Capital £5,000. Dealers in textile waste. S. B. Buckley, 75 Heybeck Lane, Woodkirk, Dewsbury, and P. M. G. Buckley. Registered Office: Ashfield Road, Morley.

Carpet Trades (West Germany) Ltd. Private. Reg. May 2. Capital £1,000. Manufacturers and dealers in carpets, etc. G. B. Wildman, Registered Office: Mill Street, Kidderminster.

Castlefield Manufacturing Co. (Textiles) Ltd. Private. Reg. May 1. Capital £1,500. G. H. Hillel, S. Jackson. Registered Office: 57/61 George Street, Manchester.

W. S. Godber Ltd. Private. Reg. May 5. Capital £40,000. Spinners, weavers, etc. C. L. Godber, J. D. Godber. Registered Office: Crocus Street Mill, Crocus Street, Nottingham.

Downeynets Ltd. Private. Reg. May 9. Capital £20,000. Dealers in nets, etc. P. O. Ansell and G. A. Corderoy, both of 116 Chancery Lane, W.C.2.

Foam Insulated Fabrics Ltd. Private. Reg. May 4. Capital £1,000. T. C. Chadwick, Mrs. A. C. Chadwick, and G. Whittle. Solicitors: Kuit Steinart and Co., Manchester 3.

Macdonald Textiles Ltd. Private. Reg. May 4. Capital £1,000. Dealers in cloth, etc. Mrs. M. A. P. H. Johnston, A. L. Johnston and T. M. Johnston. Registered Office: 54 Bedford Street, North Shields.

Butts Mill Co. of Gomersal Ltd. Private. Reg. May 18. Capital £5,000. Warp sizers and beamers. J. Falla, Mrs. J. Falla, H. Falla and Mrs. A. Falla. Registered Office: Butts Mill, Gomersal, Nr. Leeds.

O'Donnell and Mortimer Ltd. Private. Reg. May 17. Capital £5,000. Waste merchants, etc. E. O'Donnell, 9 Hobart Road, Bywell Road, Dewsbury and G. Mortimer.

B. V. Textiles (Lancashire) Ltd. Private. Reg. May 17. Capital £1,000. Dealers in textiles. H. Fallon and V. Fallon. Registered Office: 2 Union Road, Oswaldtwistle.

Fusible Interlinings Ltd. Private. Reg. May 17. Capital £1,000. Fusible interlinings and plastic manufacturers, etc. R. J. Gowland, J. A. Pitts. Registered Office: 56 Little Horton Lane, Bradford.

D. M. Greenwood (Textiles) Ltd. Private. Reg. May 19. Capital £10,000. Wool and woollen merchants. D. M. Greenwood and Mrs. W. Greenwood. Registered Office: 57-59 Well Street, Bradford.

The job is easily done and quickly too with... 'Quick-Wrap'

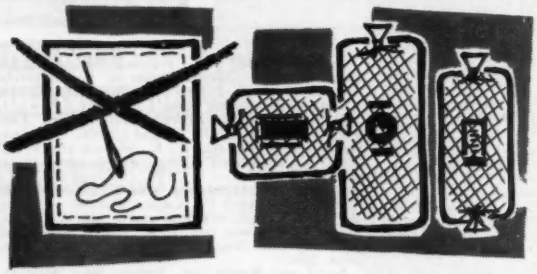
HESSIAN TUBING

Ease and speed save your money and in these days of tough competition—you just can't afford to be without 'Quick-Wrap'

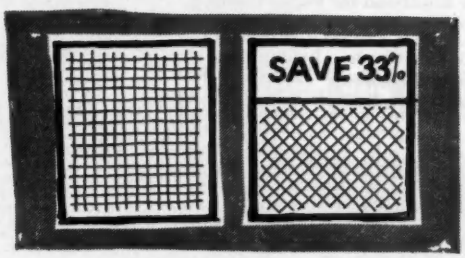
HERE ARE THE FACTS:—

'Quick-Wrap' Hessian tubing is delivered to you already sewn into tubes of over 11 different diameters and in lengths of approximately 160 yards.

'Quick-Wrap' being sewn on the Bias makes a neater package because it moulds itself to your products.



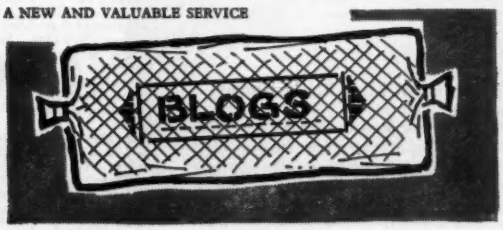
'Quick-Wrap' means you can wrap 3 to 5 parcels of goods in the time it takes to hand-sew one.



'Quick-Wrap' means less wastage, you use about 33% less Hessian and the tubes can be used time and time again.

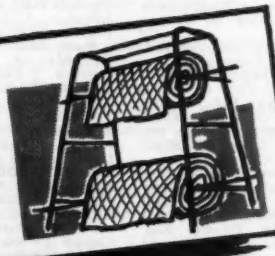
'Quick-Wrap' can be operated by unskilled labour in five easy, quick steps.

A NEW AND VALUABLE SERVICE



'Quick-Wrap' can be supplied with your Company's name or product or an advertising slogan.

***'Quick-Wrap'** can be mounted on the dispenser illustrated (supplied by Quick-Wrap Tubing Co. Ltd. at a nominal cost) for easy application.*



* Get to know more about 'Quick-Wrap', write or phone for the illustrated leaflet which tells you how to pack better all round.

'Quick-Wrap'

HESSIAN TUBING—

Packs better all round

QUICK-WRAP TUBING CO., LIMITED
Jute Mills, Bow Common Lane, London, E.3.
Telephone: EAST 3033
Suppliers to the Admiralty and Ministry of Supply

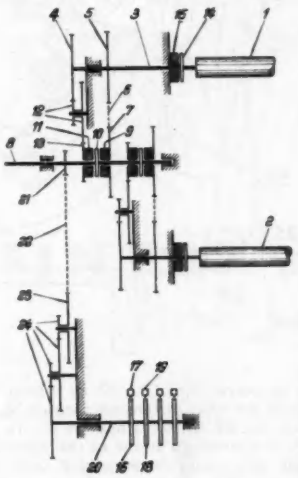
RECENT TEXTILE PATENTS

These abridgements are republished from specifications by permission of the Comptroller of H.M. Stationery Office. The full specifications can be obtained from the Patent Office, 25 Southampton Buildings, London, W.C.2. Price 3s. 6d. each (accompanied by remittance).

837,314 Fancy Yarn Doubler

BERLINER MASCHINEBAU A.G. *vormals* L. SCHWARTZKOPFF, *Berlin N 65 Scheringstr 13 - 28, Germany.*

A device for control of the delivery rollers of doubling frames for the production of multi-coloured fancy yarns. The delivery rollers can each be connected by either two transmissions to the driving shaft 8. The roller 1 is driven by a spindle 3 which can be driven from the driving shaft through one of two transmissions. One of these consists of the sprocket 5 connected to sprocket 7 with an equal number of teeth which can be driven from the driven part 9 of the magnetic clutch 10 and 9, by the chain 6. Two magnetic clutches are provided and consist of a part 10 integral with shaft 8 and two parts 9 and 11, journalled on the shaft which can be made magnetised separately so that one or other is driven by the part 10. The part 11 is



integral with wheel 13 which through two wheels 12 and 4 journalled on countershaft 3 forms the other transmission for driving spindle 3 from the driving shaft. The gear wheels of this transmission can be changed to give a variable speed ratio. More transmissions could be provided for driving the spindle 3 from the driving shaft with the use of magnetic clutches. A magnetic brake 14 and 15 is provided to brake the delivery roller when neither of the magnetic clutches is operating during the running of the frame. The control of the magnetic brake and clutches when the frame is running is carried out from programmes from the programme repeater units of which one comprises 16 and 17 and the other 18 and 19. 16 and 18 are cams driven from shaft 20, and 17 and 19 are switches operated by them. The shaft 20 can be driven, by replaceable wheels driven by shaft 8 through the sprockets 21 and 23 linked by the chain 22. Alternatively, a stepless variable friction drive could be used.

837,315 High Speed Beaming Machine

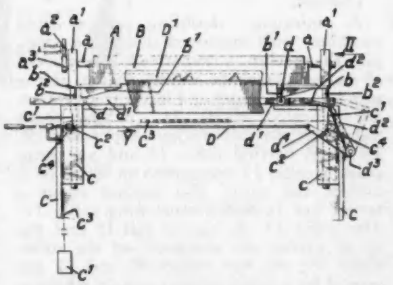
THOMAS HOLT LTD., *Atlas Iron Works, Rochdale,* F. HOLT *and* G. LEE.

Improved high speed beaming consists in beaming yarns or filaments by winding them onto a driven beam whilst the build-up of the yarn on the beam is controlled by a pressure roller resiliently loaded towards the beam. The beam is positively moved away from the pressure roller during build-up of the yarn and this movement of the beam is controlled by movement of the roller away from the beam caused by build-up of the yarn. The speed of rotation of the beam is also controlled so as to maintain a uniform linear speed of the yarn.

837,540 Conditioning Control on Warping Mills

E. WADSWORTH AND SONS LTD., *Broomfield Mills, Cleckheaton.*

Mechanism on a warping mill for removing the conditioning roller from contact with the ends when the machine is stationary. The mill is provided with a conditioning roller A, mounted on a shaft a supported in bearings a^1 at the ends of a trough B carrying the conditioning liquor. The bath is mounted on brackets b formed with a cam surface b^1 on the underside. The ends of the brackets are extended in the form of guide rods b^2 and are supported to slide in guides c. The cam surfaces b^1 each engage a roller d mounted between a pair of bars d^1 extending along the machine through slots in the side frames. The bars d^1 are connected by links d^2 to a short shaft d^3 and a crank arm d^4 is mounted on the shaft with a control rod D extending from the crank across the machine. The conditioning roller and bracket b are lowered on operation of the control rod by movement of the bars d^1 in the direction of arrow Y to bring the rollers d onto the cam surfaces b^1. In order to balance the weight of the conditioning roller, bath and brackets b, a portion of the rods b^2, is formed with teeth c^1 engaging pinions c^2 on the frame. A sprocket c^4 is also provided on the frame



over which a chain c^3 passes carrying balance weights C^1. The chain C^3 is attached to the frame and passes over pinion c^3 and second pinion c^3 at the opposite side of the frame with a balance weight C^1 suspended from it. Thus the weight of the bath acts downward on the rods b^2 whilst the counter weight C^1 act on the pinions to tend to lift the rods b^2. The conditioning roller is driven through gearing a^3, a^3, the pinion a^3 on the roller disengaging from the pinion a^2 when the roller is lowered, to prevent rotation of the roller when the machine has stopped. A guide rail D^1 is mounted adjacent the conditioning roller over which the warp ends pass and which supports the ends when the roller is lowered out of contact. The shaft d^2 is connected to a stop motion so as to be automatically turned to actuate the bars d^1 to lower the conditioning roller unit on the stopping of the machine.

837,143 Brake for Spinning and Twisting Spindles

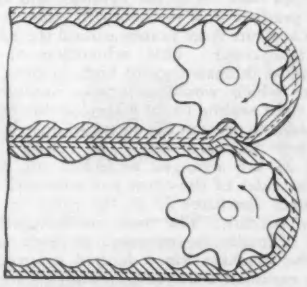
JOH. JACOB RIETER AND CIE., *Winterthur, Switzerland.*

A spindle brake has a braking surface which is an inner surface of a torus and which is mounted in such a manner as to be pivotable perpendicular to the spindle axis and in the region of a rotating spindle part. The braking surface is brought into contact with the rotating spindle part by rocking a lever connected to the element.

838,126 Improved Roller Leathers for Preparatory Spinning Machines

RESILLA COTS AND ROLLERS LTD., *Marfleet, Hull.*

Relates to endless leather bands for textile machinery and is particularly concerned with machines which include Noble combs and gill boxes. The inner surface of the endless band is fluted to engage with the flutes of the roller and the depth of the flutes of the band is less than the depth of the flutes of the roller.



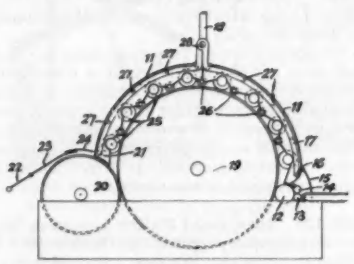
The depth of the flutes of the band may conveniently be between one third and two thirds the depth of the flutes of the roller. The bands may also be moulded from oil resistant synthetic rubber, or from a flexible plastic composition such as compounded polyvinyl chloride and should

have an efficient gripping surface. The illustration shows one pair of Noble comb fluted rollers fitted with the fluted bands.

838,138 Removal of Dust on Roller and Clearer Cards

BRITISH COTTON INDUSTRY RESEARCH ASSOCIATION, *Shirley Institute, Didsbury.*

Apparatus for dust reduction and removal during carding, especially of cotton waste, wool, flax, jute, silk and man-made fibres, and is a modification of the invention described in B.P. No. 762,403. The rollers and clearers are enclosed by a loosely fitting wooden cover 11 that terminates over the taker-in 12 and leaves the region of the taker-in 12 and feed rollers 13, 14 exposed to the atmosphere. A hinged sheet metal cover 15 and suitable end plates are arranged completely to enclose the region between the end of the cover 11, the taker-in and the feed rollers, one or both end plates having an aperture 16 to receive the end of a conduit 17 which connect to the main trunking 18 of an air-exhausting system. In the region of the junction between the cylinder 19 and the doffer 20 there is at least one secondary air disturbance due to the oscillation of the doffer comb. The exhausting means consist of a conduit 21 at one or both sides of the machine which leads from this region to the main trunking. The space exhausted by these conduits is defined by the doffer end of cover 11, and hinged deflector plates 22, 23, 24 extending from the doffer

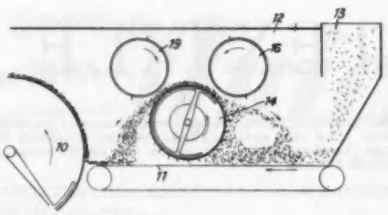


end of the cover over the doffer to the front of the machine frame together with end plates connecting these deflector plates with the sides of the machine frame so completely to enclose this region. In the region of the rollers 25 and clearers 26 the cover 11 prevents the escape of dust into the atmosphere. However, in order that the dust accumulating inside this cover shall not fall back on to the cylinder and spoil the product it is necessary to exhaust air at a low rate from points around the edges of this cover. This exhaustion of air prevents the existence of high air pressure there which would otherwise necessitate the tight sealing of the edges of this cover in order to prevent the escape of dust-laden air into the cardroom. The conduits 16 and 21 are arranged to follow the path of the sides of the cover and sub-conduits connect apertures 27 in the cover to the main conduit. The main conduit, which will normally be provided at both sides of the machine has a hinged connection to a common transverse conduit 28 which above the centre of the machine, joints the trunking 18.

838,649 Producing a Uniform Fleece

FLEISSNER AND SOHN MASCHINENFABRIK *Egelsbach, Offenbach/Main, Germany.*

Apparatus for producing a uniform fleece of loose fibrous material. The



fibrous material is inserted into a hopper 13 from which they fall upon a conveyor belt 11 which extends to a point closely in front of drum 10. Above the belt a needle drum 14 is mounted and the needles on the drum are inclined in the direction of rotation and pick up the material which lies on belt 11. At one side of drum 10, a needle roller 16 is provided with two rows of needles at diametrically opposite points of its wall, and is rotated so that the needles move in a direction opposite to the movement of the needles on drum 14. Roller 16 is spaced from drum 14 at such a distance that all of the material which extends above the needle on drum 14 will be stripped off by the needles on roller 16 and thrown back upon the conveyor belt. The fleece remaining on drum 14 is then stripped off by a further needle roller 19 which also has two rows of needles at diametrically opposite points of its wall which move in the same general direction as the needles on drum 14 so that the material falls down upon the conveyor belt. The conveyor belt then carries the material as a uniform fleece to drum 10 which picks it up by means of its suction and conveys it through the drier in the form of a bat. The suction of the drum 10 is also operative through the housing 12 to assist in conveying the material from hopper 13 and over conveyor belt 11, needle drum 14 and needle rollers 16 and 19.

838,785 Heat Treatment of Filaments etc.

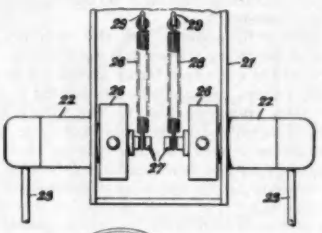
BRITISH RAYON RESEARCH ASSOCIATION, *Manchester.*

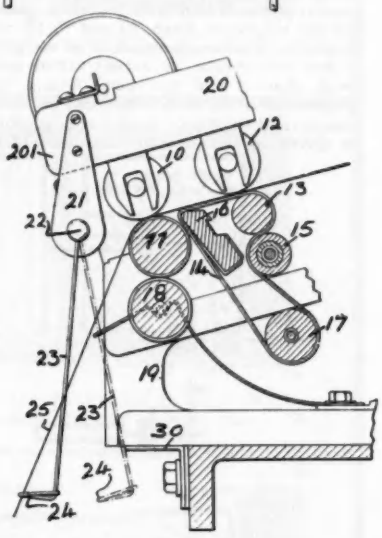
A fluidised bed container for the heat treatment of filaments, fibres, and sheet material has at least one slit in a side wall through which material can be introduced each slit being of such dimensions as to prevent passage of the bed particles selected for use in the container. Preferably only one slit will be provided and it will run vertically from top to bottom of the side wall, and extend into the base of the container, to enable material to be introduced for vertical progression through the bed.

838,908 Stop Motion for Spinning, etc. Machines

T.M.M. (RESEARCH) LTD., *Hartford Works, Oldham.*

A spinning, doubling or twisting machine, with improved means for stopping the machine automatically in the event of an end breakage in the region of the spindle. The upper and lower front rollers are indicated at 10, 11. Behind these rollers are an intermediate top roller 12, an apron driving roller 13 and an apron guiding roller 15 over which an apron 14 is driven, the apron also passing about a tensor bar 16 and a tensioning roller 17. The roller 11, its clearer roll 18 and the apron system are mounted on the roller stand 19; the top rollers 10 and 12 are carried by a roller support arm 20 which is capable of being moved pivotally. A bracket 21 is fixed to the outer end 201 of the arm 20 the bracket providing mountings for two short shafts 22, 22 which are mutually independent, and are capable of rotation about their longitudinal axes. At their outer ends they carry feeler arms 23, 23, which are looped to provide eyes 24, 24, through which the two yarns 25, of the respective roller assemblies are threaded so that the normal tension of the yarns during spinning suffices to maintain the feeler arms in the extended position. Shafts 22 also carry small disc cranks 26, 26 furnished





with eccentric pins 27, 27 to which are attached the ends of tension springs 28, 28 anchored at 29, 29 to the bracket 21. In the event of a breakage in one of the yarns the tension in spring 28 associated with the feeler arm 23 relative to the yarn, and which is now released, operates to rotate the feeler arm shaft 22, bringing the end of the feeler arm 23 into contact with a metal conductor 30 fixed upon the roller stand 19. The conductor 30 is part of the electrical stop-motion circuit, and the parts of the feeler assembly being metallic, the conductor is short-circuited and the stop-motion actuated immediately to bring the machine to a standstill.

839,334 Single Stage High Draft Apparatus

AMBLER SUPERDRAFT LTD., *Wheatley Works, Ben Rhydding, Ilkley.*

In single-stage high-draft spinning apparatus one intermediate tension roller is mounted so that it may be swung away from the other intermediate tension roller, but is normally urged by a weight towards the other intermediate tension roller, and it has at one end a gear adapted to mesh with an idler gear that is in constant mesh

with a driving gear. The idler gear is mounted on a lever, with a spring to urge the lever so as to bring the idler gear into full meshing position with the gear on the intermediate tension roller. If, when one intermediate roller is brought towards the other, the gear at one end of it does not enter into correct mesh with the idler gear, the lever carrying the idler gear is swung against its spring action by the pressure between the crests of the teeth, until the continued rotation of the idler gear allows its teeth to mesh with the other gear, when the spring urges the lever into position for the two gears to remain in correct mesh.

839,938 Tail Forming Device for Bobbin Twister

COURTAULDS (CANADA) LTD., *Cornwall, Ontario, Canada.*

Describes a yarn twisting and winding machine in which, during winding, the bobbin spindles normally remain at a constant height and the rings are mounted on a ring-rail which is raised and lowered a distance corresponding to the normal yarn winding travel. Each spindle is provided with a mechanism for raising the bobbin to enable a transfer tail to be formed on the bobbin. Preferably each spindle carries a collar which supports the bobbin, the collar being supported on a flanged member which can be raised or lowered by means of a cam or a push-rod actuated by a cam which may be manually operated. The transfer tail may be wound round a grooved ring immediately beneath the bottom flange of the bobbin, and a button which projects downwards from the flange at a distance from the axis of the bobbin, the path of the yarn to and from the grooved ring being determined by a double "V" notch in the bottom flange of the bobbin.

840,591 Continuous Card Stripping Apparatus

TSUNEJIRO SAKANOUE, *No. 1135, 4-chome, Matsubara-cho Setagaya-ku, Tokyo, Japan.*

An improved continuous-cleaning apparatus of the suction type for enhancing the carding action of a carding engine. The apparatus comprises a suction nozzle and means for reciprocating the nozzle along an axis parallel to the axis of rotation of the cylinder in such a way that the nozzle opens in close proximity to the surface of the cylinder throughout its reciprocating movement. Sealing means are provided to concentrate the suction effect upon the surface of the cylinder, the sealing comprising stationary cover plates overlying the surface of the cylinder, between which plates the nozzle is reciprocable, and a flexible cover band through which the nozzle passes. The cover band is adapted to close the slot-like opening between the cover plates and to reciprocate with the nozzle, means being provided to alternately roll-up and un-roll the two ends of the band during its reciprocating movement.

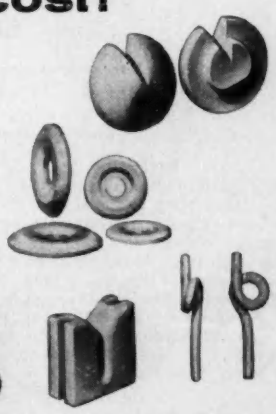
840,938 Single Stage High Draft Apparatus

AMBLER SUPERDRAFT LTD., *Wheatley Works, Ben Rhydding, Ilkley.*

In single-stage high-draft spinning apparatus the intermediate tension rollers consist of one roller with two flanges, and another roller with a single flange to fit between the two flanges of the first roller, with loading means applied to one roller to press it towards the other roller. A stationary block of smooth material is mounted near each intermediate roller, on the side of the roller away from its engagement with the other roller. One block has a single groove to embrace closely the sides and periphery of the single flange on one roller, and the other block has two grooves to embrace closely the inner sides and the peripheries of the two flanges on the other roller. If a fibre protruding from the bundle leaving the pair of intermediate rollers should attempt to follow the periphery of either of the rollers, or of the flanges, it soon encounters the block associated with that roller, and the closely fitting grooves in the blocks prevent the fibre from being drawn round the rollers.

SINTOX 'standards' cut your cost!

Low initial cost and indefinite life are two good reasons why SINTOX ceramic thread guides have gained such great demand. The SINTOX standard range allows manufacturers to select the required thread guides easily and correctly and achieves savings up to 55%. Technical advice on the application of SINTOX is always given with pleasure, by our selling agents.



SINTOX — A PRODUCT OF LODGE

CERAMIC THREAD GUIDES

Manufactured by Lodge Plugs Ltd., Rugby, England

Post the coupon

To CRABTREE TEXTILE ACCESSORIES LTD., COLNE, LANCASHIRE

Sole selling agents for Sintox thread guides.
Please send me wall chart showing complete range.

NAME.....

ADDRESS.....

.....

CLASSIFIED ADVERTISEMENTS

Machinery, Plant, Accessories For Sale

ONE Boyd Patent Ring Twister, Class "O", 144 Spindles, 72 Spindles per Side, 6 in. Pitch, 9 in. × 4 in. Bottle Bobbin, Year 1951. For further details and price, or inspection, apply or call: Thomson, Shepherd and Co. Ltd., Seafield Works, Dundee. *'Phone:* Dundee 67248.

FOUR Hobourn, 3/30, Style 50, Coning Machines; two Leesona, 3/30, Style 50, Coning Machines; one Scragg DA.100 Spindle Silk Doubler, 3 in. Ring, and one Set, 2 Units, Textile Air Humidifiers. Box No. TF81, "Textile Manufacturer," 31 King Street West, Manchester 3.

FULL Steam in five minutes with B. and A. Electrode Boilers, used by British industries for over 25 years. No boilerhouse, no flue, no attendant needed. The most compact and convenient steam raisers available, can go beside machines using the steam. Write for Leaflet 220. Bastian and Allen Ltd., Ferndale Terrace, Harrow, Middlesex.

Classified advertisements are inserted at the rate of 4/- per line.

Machinery, Plant, Accessories For Sale

MANUFACTURERS of sectional water storage tanks, 50 to 40,000 gallons capacity. Sewage and Effluent Pumps. G. L. Murphy Limited, Imperial Works, Menston, Nr. Leeds.

FOR Sale, quantity Fairbairn Breaker Doffer, Worker and Cylinder Staves, new and unused. Full Details. Box No. TE79 "Textile Manufacturer," 31 King Street West, Manchester 3.

Machinery, Plant, Accessories Wanted

HORIZONTAL and Vertical Diesel Engines and Generating Sets wanted for export. Full details, please, to Vizard, 39 Essex Road, Leicester.

WOOLLEN & WORSTED YARN MANUFACTURE

By J. W. RADCLIFFE

PRINCIPAL CONTENTS

Selection of raw materials—Physical Structures of Wool and other fibres. Selection and Sorting—Comparisons in Woollen and Worsted Yarn Manufacture—Wool Scouring—Wool Drying—Blending—Setting and Speeding Arrangements—Woollen Carding—Back-Washing—Preparing and Drafting—Combing—Top Testing—Drawing Operations—Cone Drawing—French Drawing—Comparisons of Spinning Machinery—The Self-acting Worsted Mule—Mule Spinning—Standard Twists for various types of Yarns—Types of Fancy Yarns—Yarn Counts—Twisting and Reeling—Modern Scouring Plant.

Cr. 8vo. 420 pages with 170 illustrations.

Price 21/- net **By Post 21/9**

May be ordered from any bookseller or direct from the Publishers

EMMOTT & CO. LTD.

31 KING STREET WEST, MANCHESTER 3
London: 158 Temple Chambers, Temple Ave., E.C.4

MECHANICAL WORLD
FLOWSHEETS
OF INDUSTRIAL PROCESSES

252 Flowsheets are now available printed on strong paper and issued in folders in sets of twelve as listed below. They are invaluable for getting a quick grasp of the plant, processes and methods an industry employs, and as a basis for planning innumerable activities.

Each series of twelve Flowsheets 6/- post free. Single copies 1/- each, post free.

Series 7

73. Dry Battery Manufacture; 74. Continuous Steel Strip Manufacture (I); 75. Continuous Steel Strip Manufacture (II); 76. Cotton Manufacture (I); 77. Cotton Manufacture (II); 78. Refractory Materials; 79. Flax Preparation and Linen Manufacture (I); 80. Flax Preparation and Linen Manufacture (II); 81. Rayon Manufacture (I); 82 Rayon Manufacture (II); 83. Cellulose Acetate Silk; 84. Staple Fibre and Staple Fibre Yarn Manufacture.

Series 8

85. Tungsten Production; 86. Hot and Cold Galvanising; 87. Sherardising Process; 88. Woollen Manufacture (I); 89. Woollen Manufacture (II); 90. Alloy Steels Manufacture; 91. Rubber Manufacture; 92. Nitric Acid Manufacture; 93. Ferrous Foundry Sand Treatment and Processing; 94. Photographic Dry-plate Manufacture; 95. Plaster Wall Board Manufacture; 96. Alkali Manufacture, Soda-Ash, Caustic Soda, etc., Ammonia-Soda Process.

Series 9

97. Carbon Electrode Manufacture; 98. Hot Tinning Iron and Steel Articles; 99. Electro-Plating; 100. Alkali Manufacture, Caustic Soda and By-products; Electrolytic Process; 101. Cellulose Film Manufacture; 102. Worsted Manufacture (I); 103. Worsted Manufacture (II); 104. Gramophone Record Manufacture; 105. Pigments and Paint Manufacture (I); 106. Pigments and Paint Manufacture (II); 107. Hot Tinning Copper and Copper Alloys; 108. Calcium Carbide Manufacture and Acetylene.

Series 10

109. Synthetic Rubber; 110. Metal Spraying; 111. Molybdenum Ore Dressing; 112. Industrial Alcohol Manufacture; 113. Superphosphate Manufacture; 114. Brass Sheet and Strip Manufacture; 115. Celluloid Manufacture; 116. Wood Cellulose Manufacture (Sulphite Pulp); 117. Wood Charcoal and Distillation Products; 118. Cotton Cellulose Manufacture; 119. Asbestos (Extraction and Preparation); 120. Bone Manure Manufacture, Bone Dust and Bone Superphosphate.

Series 11

121. Glycerine Manufacture; 122. Hydrogenation of Oils into Edible Fats; 123. Crude Petroleum Distillation; 124. Coal Briquetting; 125. Manufacture of Magnesia (Sea Water Process); 127. Magnesium Manufacture (Electrolytic Process); 128. Briquetting Steel and Non-ferrous Swarf; 129. Oxygen and Hydrogen Production; 130. Oil Varnish Manufacture; 131. Linseed Oil Manufacture; 132. Animal Feedingstuffs Manufacture.

Series 12

133. Diamond Die Manufacture; 134. Plywood Manufacture; 135. Aerated Beverage Manufacture; 136. Felt Hat Manufacture; 137. Shellac Manufacture; 138. Synthetic Sapphire Bearing Manufacture; 139. Crude Lactose and Whey Powder Manufacture; 140. Abrasive and Grinding Wheel Manufacture; 141. Reclaimed Rubber Manufacture (Alkali Process); 142. Continuous Filament Glass Yarn Manufacture; 143. Dehydration of Meat; 144. Dehydration of Vegetables.

Obtainable now from:

EMMOTT & CO. LTD., 31 King Street West, Manchester 3 and 158 Temple Chambers, Temple Avenue, London EC4.

F2